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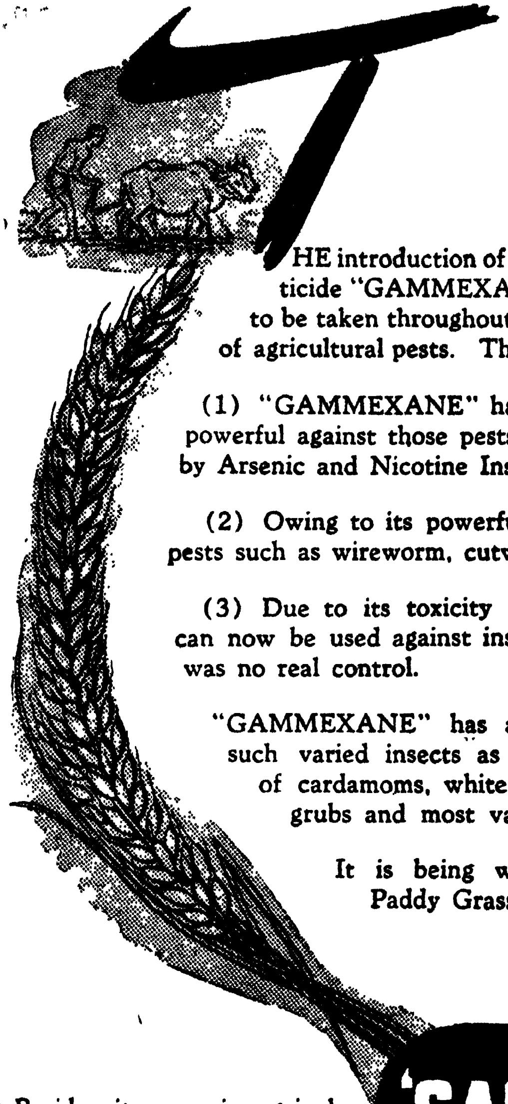
TO OUR CONTRIBUTORS.

Paper is still in short supply. The cost of printing is high — and the Editorial Board will feel obliged if your articles are brief.



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The Madras Agricultural Journal

(ORGAN OF THE M. A. S. UNION)

Vol. XXXVI August 1949 No. 8

Editorial

The Thirty-second College Day and Conference: The annual College Day and Conference was a great success. The conference had for the main topic of discussion, "How best to translate the results of research into farming practices" and a number of interesting papers dealing with the various aspects of the problem were contributed. The Premier of Madras who inaugurated the conference after analysing the various causes that led to the present food situation in the country, dwelt on the steps taken by the present Government towards the improvement of the conditions of the agriculturist and emphasised the need for making an all-out effort to reach the target of self-sufficiency within the prescribed time limit of two years. He exhorted the public servants, especially the members of the Agricultural department to approach the cultivator in a spirit of service and sympathy rather one of patronage and power, in order to "harmonise the result of researches in the laboratories with the traditional ways of cultivators". It is significant that not only the Premier but also the Minister for Agriculture and the Director of Agriculture laid emphasis on the need for the right approach to the ryot as the first essential towards successful propaganda in agricultural matters. All the three stressed that the Indian ryot in spite of his illiteracy and poverty is not so ignorant of agricultural matters as he was supposed to be by superficial observers. The members of the Agricultural department more than any others are fully aware of this fact and we suppose it was the patronising and superior attitude assumed by the foreign experts in the earlier years that has led to the general belief that the 'Scientific Exper' is belittling the agricultural knowledge of the Indian Cultivator. But, nevertheless, it is well to be reminded of the fact and we would request the younger members of the department to make a special note of this advice.

Mr. A. B. Shetty in his speech dwelt on an aspect of the food problem which has not yet received sufficient attention on all hands, that is, the regulation of the population in relation to available food supplies. In a country like India the problem is both a delicate and difficult one, but one, which merits more attention and thought than it receives at present.

The Minister for Agriculture and the Director of Agriculture emphasised on the need for allocation of a greater share of the provincial revenue towards agricultural development. The allotment of Rs. 1·36 crores forming only 2·4% of the total revenue is all too meagre for doing justice to the most important industry of the province. The present food crisis has brought to the forefront the price we have to pay for neglecting agriculture and we hope that the days of treating agriculture as the Cindrella of Administration are once for all passed.

The several papers that were read at the Conference were unanimous that more demonstration farms should be opened where the ryot could see for himself the results achieved by research and take up such of those improvements he felt convinced would lead to improved returns on his lands.

Second year of Independence: Two years have passed since the country has gained Indepence. In this short period the country had to face great tribulations and trials. Millions of our people had to undergo untold hardships as a result of the partition. Mahathma Gandhi was killed but thanks to the ability and steadfastness of its present leaders, the country has weathered the storm and has survived the ordeal. The Food Problem is now facing us and the Prime Minister of India has immense faith in her people and we have no doubt that they will not let him down.

Varieties and Forms of the Coconut

(*Cocos nucifera* Linn.)*

By

G. V. NARAYANA & C. M. JOHN

The Country of Origin: The coconut belongs to the family of palms viz., *Palmaceae*. It is a very useful tree cultivated by man from very ancient times. De Candolle and others consider the Indian Archipelago to be the original home of the coconut. It is a unique species in respect of the characters of the stem and the nut and is very much unlike any other known species of *Cocos*. The coconut stands in a class by itself. There are some thirty species of *Cocos* and all these are wild in native America, though some of them have been brought under cultivation for ornamental purposes. If all the known species of *Cocos* have an American origin, it is difficult to explain how the coconut alone originated in the Indian Archipelago; and some (Bailey 1937) believe that America is the home of the coconut. By some others, the millions of years old fossil coconut of New-Zealand which is of the size of an arecanut is considered to be the progenitor of the present–day coconut. The consensus of opinion, however, regarding the origin is that the Indian Archipelago should be the original home of the coconut.

Variations in Characters: The generic name *Cocos* is derived from a Portuguese word for a monkey. The eye end of a coconut when the husk is removed, resembles the face of a monkey; and the specific name *nucifera* refers to the kernel bearing nature of the nut. The palm has been in cultivation for several centuries under varying conditions of soil and climate, up to 20° to 23° of latitude on either side of the equator and from the sea level up to an altitude of about 3,000 feet Therefore, naturally considerable variations in the characters of the species occur. The stem may be thin or robust and its length may vary from just a few feet to 100 feet or more. Even in grown-up palms the length of the leaf and the petiole varies. A fully opened leaf may be 10-17 feet long depending on the nature of the soil and the age of the palm. The flower bunch (inflorescence) may be branched (a spadix) or rarely unbranched. The number of male and female flowers varies considerably, the former from 150-14,000 and the latter from 25-600 in a single inflorescence. The method of pollination may

* Paper presented at the Thirty-second College Day and Conference.

be cross or self. The time taken from pollination till the nut is ripe is 9 to 12 months. The shape of the nut ranges from linear to spheriod. The weight of copra or dried kernel which is the most important coconut product of commerce ranges from about an ounce to about 12 ounces. The percentage of oil (on moisture-free basis) in the copra varies from 65 to 75 (by chemical extraction). The life of the palm extends from 35 to 100 years. The range of colour variations also is considerable. The leaves and nuts may be green, yellow or rarely red or shades of brown. From the foregoing it is evident that the coconut is a variable species and one would expect a large number of varieties occurring in different coconut countries of the world. But considering the antiquity and the cosmopolitan nature of the species, the number of the so-called varieties of the coconut is rather limited. From a reference to the literature on the subject, it appears that the total number of the varieties in all the coconut countries is estimated not to exceed some thirty. Even this number may be reduced considerably if all the varieties were studied in the field in one place and the over-lapping ones are eliminated. Abnormalities and freaks sometimes called varieties are not to be included among the varieties proper.

Review of Literature: A few publications from important coconut countries are reviewed here:

Watt. (1889) mentions seven varieties of the coconut. He also states that "a small form is met with in East Africa that does not possess the fibrous pericarp". It is not clear what variety is meant. Perhaps he speaks of a dwarf with very thin husk. If so, such forms are well known in India. Barring this, the remaining six may be grouped into three distinct varieties viz., (1) the dwarf, (2) the ordinary tall and (3) the one bearing small nuts of the size of a turkey's egg. The fourth one "with heart-shaped fruit, pale-yellow colour, with an edible inner rind which turns red when the outer skin is removed" is possibly the one with sweet husk mentioned by various authors. The remaining two which are distinguished by their colour and shape of the nut can only be normal variants of the ordinary variety commonly grown in India. Hooker (1894) mentions of C. *nucifera* Linn. as the most commonly cultivated species and C. *nana* Griff. as a small low. variety grown in the Maldive islands and Ceylon. Trimen (1898) speaks of C. *nana* Griff. as "a very small-fruited dwarf sort going by the name of Maldive coconut". Here this dwarf variety appears to have been given the status of a species. It will be seen later that this is only a variety. He also speaks of a variety by name 'Tembili' with pink endosperm and called the king coconut. The name 'Tembili' is mentioned by Watt also but the colour of the endosperm which is unique in Trimen's 'Tembili' is not mentioned by Watt. The name 'King coconut' is given to the dwarf variety by other authors.

Ahmed Bin Haji Omar (1919) writes of the races of the coconut palm. He says that in the Singapore island there are twelve races differing in the characters of the nut and two in growth also. He mentions four races viz., Klapa Jatong, K. Bulat, K. Besar and K. Sepang from which copra is made in Singapore. K. Laga has too small a nut to be used in making copra. Two dwarf races viz., K. Puyoh (green) and K. Gading (yellow) are also included. K. Nipah is a promising high yielder but is not common. The shell of

K. Sekol is used for making cups. K. Wangi is said to have a 'peculiarly fragrant' endosperm and is medicinal. This unique coconut is also mentioned by Burkill (1935). He (Omar) has not described the races but has given photographs of the different nuts. The name Klapa or Kelpa meaning coconut is perhaps allied to Kalpa in Kalpa Vriksha (Paradise tree) a Sanskrit name for the coconut palm.

A Useful Dwarf Coconut: Handover (1919), and Jack and Sands (1922) have described a Dwarf Coconut called Nyiur Gading. It is a distinct small variety common in the Malay States, supposed to have been originally introduced from the Dutch Indies. Perhaps this variety first occurred as a mutant in Java. It is a small, hardy palm which begins to bear in about three years after planting. Bearing is profuse and the yield is said to be about 120 nuts per tree, per year. The thickness of kernel is good and the quality of copra is satisfactory. About 8400 nuts yield a ton of copra. The kernel is rich in oil and sweeter than that of the ordinary variety. Trees thirty years old, occurring in various parts of Malaya are said to be bearing profusely. Colour variants with yellow, golden, ivory yellow, green, brick red, green bronze and intermediate colours occur in the variety. The chances for self-pollination are more in this variety than in the ordinary one; 70—80 % or more of the progenies may breed true to type. This is the only dwarf grown on a plantation scale.

This useful variety may not be confused with other dwarf races or forms which go by different names—King coconut, Nicobar Dwarf, Laccadive Dwarf, Andaman Dwarf, Malay Dwarf, Chowghat (Malabar) Dwarf and Pathunettam-patta. These will be considered later. In fact, Nyiur Gading comes under the group of palms called semi-talls or medium dwarfs which are more hardy and robust than the true dwarfs, and have copra of good quality. The nut matures in about 11 months after pollination. The time of first bearing occurs in about four years after planting. The Tall X Dwarf or the Hybrid coconut evolved by the Department of Agriculture Madras, and the Ganga-bondam of the Circars (S. India) belong to this group of coconut palms.

Philippine Forms: Copeland (1931) in his book on the coconut has dealt with fourteen varieties occurring in the Philippines and the adjoining islands. Of these, five including Nyiur Gading already mentioned, are more important than the rest which include minor forms and freaks or abnormalities.

1. **The San Ramon:** This is a very high-yielding form with large nuts nearly twice as large as the ordinary, 3270 nuts giving a ton of copra. The yield is at times, said to be even 200 nuts per year. The distribution of the form ranges from Ceylon across Malaya and Polynesia. This is perhaps the largest nut found on a plantation scale. The large-sized nuts from Ceylon and the Kappadan of Malabar are allied to this form. From the account given the form is a very promising one for large-scale planting.

2. **The Lagana:** This is the ordinary tall variety, the most common and popular one typical of all the coconut countries of the world. About 6000 nuts are required to produce a ton of copra.

3. **The Coco-nino or the baby coconut:** This is a distinct, dwarf form with short trunk bearing in about four years after planting. It is a prolific bearer with rather thick and hard copra. About 100 nuts are produced by a single tree in a year. Some 7000 or more nuts are required to make a ton of copra. The form is specially valued for tapping and this is a promising one.

4. **The Pugai:** This is a very dwarf form fruiting in three years after planting. The husked nut is about 7 cms. in diameter and the husk is ? cms. thick. The nut is so small that it does not seem to be economical for large-scale planting.

These four varieties fall into two main groups viz., the Tall and the Dwarf. Besides the varieties described in the foregoing, Copeland mentions others viz., Makapuno, the Thyru Thengai (curd coconut) of Malabar which has the cavity filled with a firm tissue and is considered a delicacy. This is occasionally found in coconut plantations. The nut does not germinate when planted and produce a seedling. The Makapuno is an abnormality. Certain trees produce both the normal and the abnormal nuts. The normal ones from such trees when planted produce trees giving Makapuno nuts also. Lono nuts with soft kernel and Taban with sweet husk are also mentioned. Taban is known to occur in the Malabar coast also where it is called Kaiththali. There are other types also specially used for decorative purposes, or for their very thick or very thin shell or husk. The one called Lincoranag has a characteristic low habit of growth. Among the colour types the one called Agta is unique in having a dark green colour almost looking black.

Variety spicata: Jacob (1941) described a very distinct botanical variety called variety *spicta*. This is sometimes known as the spikeless coconut because the inflorescence is unbranched and is without the usual flower-bearing spikes. For the same reason it is called the Panamaram Thengai in Tamil, meaning the Palmyrah coconut. This variety is unique in that it is the only one in which femaleness is most expressed and maleness least expressed, because the number of male flowers is as low as 50, while in the ordinary coconut the number of female flowers is very much less than that of the male flowers viz., 25 and 600 (average) respectively. The setting percentage i. e., the number of nuts produced per 100 female flowers is very low. The mature nut is smaller than in the ordinary variety; otherwise the characters of the nut are the same. At the Coconut Research Station, Kasaragod (S. India), it was found that 50% of the progenies (natural) of variety *spicata* bred true to the mother. This variety was also found to cross freely with other coconut varieties. The resulting hybrids were vigorous. Variety *spicata* can be made use of in coconut breeding, but is useless for tapping.

The Male Coconut: Var. *spicata* is one extreme of sex expression. It is almost a pure female except for a few male flowers. On the other hand, there is a tree at Kasaragod which is completely a male. It looks very much like any other ordinary coconut tree but is more robust, especially the inflorescence. But it contains all male flowers only, some 5000 per bunch, and is never known to have produced any female flowers or nuts. Similar male coconut trees are said to be found in parts of Malabar. The separation of sexes in different individuals is no doubt a sign of advancement in evolution. But from an economic point of view a male coconut tree is not only unnecessary but undesirable, because it is a loss to the planter. This rare find was described by John and Narayana (1942).

The Hybrid Coconut: John and Venkatanarayana (1943) described the hybrid coconut. It is also called the Tall × Dwarf cross because it is obtained by crossing the ordinary tall variety with the pollen from the dwarf. The study of the hybrids on a field scale has been in progress during the last fifteen years at the Coconut Research Station, Nileshwar (Malabar Coast). The progenies are vigorous, with a short trunk and low habit. They

are early and prolific bearers; they first flower in four years after planting and the nuts mature eleven months later. Their performance has been satisfactory. The yield of nuts is high and the quality and quantity of copra are fairly good. A few seedlings obtained from the hybrids were planted in the field and it remains to be seen how they will do when they begin to yield. Even if the hybrid does not produce palms similiar to itself, it is not a serious drawback, because it lives for a sufficiently long period, and seed nuts to raise new hybrids have to be produced by artificial crossing. A number of inter-varietal, cyclic crosses between world varieties and forms are in the field. They are still too young to bear and it is too early to judge them. Still it may be said that hybridisation has opened a new line in the improvement of the coconut by producing new strains.

Freaks and Abnormalities: A dozen instances of abnormalities are mentioned by Patel (1938), and others in earlier years. These abnormalities are popularly, though incorrectly called varieties. They are, however, dealt with briefly in the following:

Poly-embryony: This is the phenomenon of a single coconut producing more than one seedling. The number may be two to four. More seedlings are produced on account of more embryos in the nut.

Branching Coconut: The ordinary coconut palm has only one growing poin which gives rise to a single unbranched trunk. Various authors have recorded instances of coconut trees with a number of branches.

Foliation of the Spadix: This is an instance in which the flower buncht instead of producing flowers and nuts developed small branches which have subsequently dropped off.

Vivipary: Here the young female flowers instead of developing into normal nuts grew into bulbils or small seedlings, which however, when planted in the ground failed to establish themselves.

Suckering Coconut: This is a rare instance of a coconut tree producing suckers like a plantain. The tree is at Kasaragod (South India). A picture of the tree is given by Patel (1938) in his Monograph on the coconut. When separated from the mother and planted in the field the sucker gave rise to quite a normal tree.

Horned Coconut: At times one or two flat horns of vaiying sizes are found developing from the base of the nut. These are modifications of the staminode of the female flower.

Also instance of the pistillode of the male flower developing banana like structures have been recorded. Certain coconuts with semi-solid kernel, and others with sweet husk are already mentioned in the previous pages.

The freaks though interesting by themselves are not of any economic use; and most of them occur in all the important coconut growing countries.

Classification ot Varieties: The occurrence of different varieties and races in the various coconut growing countries of the world is well known. Most of them have been dealt with by authors as already mentioned. But a systematic classification of the known varieties does not seem to have been attempted. This is perhaps due to the fact, that the material to be handled is very difficult. Though certain varieties appear to be quite distinct, when considered by themselves, it is possible to connect up most of them except var. *spicata,* by a graded series of intermediate forms. This would naturally lead to considerable difficulty in defining the boundaries of any variety. Still it is necessary to separate the varieties as far as possible into definite groups and place them in their proper position. If not, the knowledge of the subject will tend to be confused. An attempt, therefore, is made in this paper to classify and name the outstanding varieties and forms.

The coconut is an important crop in South India and it has been studied by the Department of Agriculture, Madras, in its various aspects, during the last 33 years. The Department has maintained four Coconut Research Stations in the Malabar Coast, at Kasaragod, Nileshwar and Pilicode. With a view to studying the important world varieties, planting material was obtained in 1921 and 1924 from all the chief coconut-growing countries viz., Malay, Philippines, Java, Siam, Cochin-China, Ceylon and Laccadives, and planted it at the Coconut Research Station, Pilicode. The various economic characters of the varieties have been studied and the different forms are included in this paper.

The name variety is often used by many in the popular sense to include any variant whether it is a botanical variety, form or type. In the following account variety will be used only for botanical varieties, and races or forms and types will be denoted as such. From a study of the available material and perusal of the literature on the subject all varieties and forms can be broadly divided into two main groups viz., the tall and the dwarf. In each group there are number of forms. Eco-types of a form, such as heavy yielders and poor bearers are of local importance only and may not have much classificatory value.

The cosmopolitan species *Cocos nucifera* Linn., is divided into five varieties viz., var. *spicata* K. C. Jacob; var. *typica* Nar.; var. *nana (Griff)* Nar.; var. *javanica* Nar.; and var. *androgena* Nar. All these varieties cross with each other freely. Var. *spicata*

was already considered. Var. *typica* is the ordinary, tall variety, found in all the coconut countries of the world, and includes most forms some of which are named here as: *ramona, Kappadan, malayensis, siamea, cochin-chinensis, nova-guineana, gigantea, pusilla*, and *laccadive*. The large nuts from Ceylon and *Kappadan* from Malabar are allied to forma *ramona*, but the yield of nuts of these forms is less than that of *ramona* in the Philippines. Var. *nana* is the dwarf variety. and 'nana' is the earliest known name given to it. This includes all the pure dwarfs, and the forma *nana* (Coco-nino or baby coconut) and forma *maldiviana* (the Pugai of the Philippines). The first form has larger and economically more useful nuts, while the second has smaller ones. The Laccadive or Maldive Dwarf, the Andaman Dwarf, the Chowghat Dwarf, the Chennangi and the King coconuts etc., come under forma *maldiviana*.

Var. *javanica* is Nyiur Gading said to be originally a mutant from Java. It is intermediate between the tall and the dwarf varieties and is breeding true; economically it is important. As it is considered to be a mutant a separate varietal status is given to it. The Gangabondam and the hybrid coconut of Madras belong to this variety. A tall type of coconut recorded as 'Java' at the Coconut Research Station, Pilicode may not be confused with var. *javanica*.

Var. *androgena* is the male coconut palm. A purely male tree is a unique occurrence and it is here given a different varietal name.

Descriptions of Varieties and Forms: Var. *typica*. This is otherwise called the ordinary or the common Tall variety and is most extensively grown on a plantation scale in all the coconut tracts of India and elsewhere. Though the coconut is not said to be a native of India by botanists, the ordinary variety has been in cultivation in India from very ancient times and may therefore be considered for all practical purposes to be the indigenous variety.

It is a long-lived, hardy palm thriving under different soils, climate and rainfall, and is found in littoral sands as well as in table lands up to an altitude of about 3,000 ft. above sea level. It begins to bear in about eight to ten years after planting. Given sufficient soil moisture and plant food it grows well and lives to an age of about 80—90 years, and is fairly resistant to diseases and pests.

The stem of the palm, or trunk is smooth and erect and of medium girth of about 2 to 2½ ft. under rainfed conditions becoming stouter and more robust in irrigated and rich soils. The trees attain a height of about 50 to 60 feet or more. Every leaf axil of the bearing tree contains a spathe enclosing a spadix or branched spike. Female flowers which are only few are at the base of the spike and the numerous male flowers studded all over, occupy the rest of the spike. These open first and are shed in a period of nearly three weeks. Then the female flowers open and become receptive. Therefore the common occurrence in South India is that they are ordinarily cross-pollinated in nature, except in the summer months when there are chances for self pollination due to overlapping of spadices. After pollination, the nut matures in a period of twelve months, when it is fit for planting. Tender nuts are best obtained when they are about 5½ months old after pollination. The nut is medium sized varying in shape from spheroid to linear with colours varying from green, yellow and orange to shades of brown. The quantity and quality of copra are satisfactory. About 6,000 nuts yield a ton of copra.

There are many eco-types in this variety as heavy bearers, medium bearers, low yielders etc. The heavy bearers yield about 100 nuts per tree, per year under rainfed conditions. Early yielding, medium and heavy bearers are considered good for seed purposes. Alternate and irregular bearers are also met with in the variety; they give bumper crops in some years only, and are not selected for seed purposes.

The main forms of the var. *typica* are described in the following:—

1. Forma *ramona:* This form with large nuts and high copra content is described under the Review of Literature.

2. Forma *Kappadan*: The form is called Kappadan with reference to the large quantity of water contained in the tender-nut, (Kappadan = 16 bottles by volume). It is a form allied to the var. *typica* proper but is more robust in all characters, particularly in the size of the nut which is one of the largest on record. The shape of the nuts is broadly ellipsoid. The yield is rather low. Quantity of copra is high and copra is thick and hard.

This form is closely related to forma *ramona* and appears to have been naturalised in the West Coast and is met with in parts of South Malabar. The large nuts from Ceylon are similar to this form.

3. Forma *gigantea:* This is a form from the Andaman islands. As the name indicates, the form consists of palms with tall stature, massive proportions and majestic appearance. The nuts are round, green, and large; perhaps the largest on record. But the yield is poor, with only three or four nuts in a bunch. Though the copra content is high, the copra is thin and of poor quality. Water in the tendernut is plentiful and insipid in taste. The spathe did not yield to tapping and gave practically no juice.

First flowering occurs in about eight years after planting. It is not an economically important variety. The palms are resistant to diseases. The seed nuts give poor germination. A closely related type of this form, by name Andaman Ordinary is available at the Coconut Research Station, Pilicode. It is a good yielder of toddy. Nuts are big and similar in shape and appearance to those of forma *gigantea*. Stature is smaller than that of *gigantea*.

4. Forma *nova-guineana*: This is one of the forms of large sized palms. The palm is robust with a tall, stout trunk and a massive crown with large number of long leaves and bunches. The female flower production is high and setting percentage is rather low. The yield of nuts is fairly good being about 75 nuts per tree, per year. The nuts are medium-large, spheroid or ellipsoid in shape and green or orange brown in colour. The water in the tendernut is plentiful and sweet. Copra is thin and rather poor in quality. Percentage of oil in copra is low, being 66·2.

This palm comes to bearing in about seven years after planting. The form is unique in producing leaves and bunches in very quick succession. Sometimes two inflorescences open even on the same day especially in the summer months, while in var. *typica* proper the interval between the opening of successive bunches or inflorescences is about 25-30 days. This character contributes to high yield and is useful to the breeder. In its native habitat the form is said to produce one of the largest-sized nuts.

This form is susceptible to the attack of fungoid diseases, and pests.

5. Forma *cochin-chinensis:* The palm is robust with rather stout, tall trunk and large round crown well filled with large number of leaves and bunches. The bunches are large, full of fairly large-sized, spheroid nuts. The colour varies from green to shades

of brown. Female flower production is rather low but setting percentage is high. Tendernut has fairly large quantity of sweet water. The yield is high but the meat is thin; quality of copra is fair.

The palm comes to bearing in about eight years after planting. It is a useful variety possessing the desirable characters of high yield, medium-large size of nut and high setting percentage. The palms of this form are susceptible to the attack of fungoid diseases, and pests.

6. Forma *malayensis :* The palms of this form have a tall habit and the trunk is rather stout. The yield of nuts is low and the nuts are medium to large in size, green, and quite round or spheroid in shape. The water in the tendernut is sweet and plentiful with peculiar aroma about it. Copra content of nut is high and the quality is fairly good. The percentage of oil in copra is rather low. Female flower production is low and the setting is fair. The base of the button has a rose-ring seen clearly when the perianth is removed.

It is a late-yielding variety coming to bearing in about ten years after planting. It is highly susceptible to diseases and pests and there is fairly high shedding of buttons and tender nuts, but the form is good for tender nuts.

7. Forma *siamea :* This is an economically important form from Siam allied to forma *ramona.* The trunk is rather short and fairly robust with a good compact crown. The yield is medium, and the nuts are green, rather large-sized and ellipsoid or spheroid in shape. The water in tendernut is sweet and plentiful. The quality and quantity of copra are fairly good and the copra contains as much as 74·0% of oil. Female flower production is rather low and the setting percentage is moderately good.

The form is a late bearer beginning to yield in about ten years after planting. It possesses the desirable characters viz., good quality and quantity of copra and high percentage of oil, and is a useful form.

8. Forma *laccadive :* This form very much resembles the ordinary tall variety viz., var. *typica,* Female flower production and setting percentage are high. The nuts are medium sized, the quality and quantity of copra are good. Tendernut water is

satisfactory. The yield is high being above 100 nuts per tree, per year. It is a regular and heavy yielder of nuts. It gave the highest yield of toddy–twice as much as var. *typica.*

Economically it is a promising form on account of its high yield and good quality and quantity of copra. It will be worth while multiplying this form on a large scale in India.

9. Forma *pusilla:* This form resembles var. *typica* but is characterised by small-sized nuts and large bunches containing as many as 100 nuts or more in a bunch. The annual yield at times may be as high as 400 nuts per tree. Water or milk in the tendernut is very little and fairly sweet. The quality of copra is good though the quantity per nut is low on account of the small size of the nut. But the number makes up for the size. The form is unique for high female flower production and high setting percentage and yield-three important economic characters. Also the percentage of oil in the copra is very high, being 75%.

The shape of the nut is linear or spheriod according to the type. Spheroid nuts (unhusked) are at times very small being only of the size of a large orange. Then the number of nuts per bunch goes up to even 200. But the only drawback with the form is that it does not seem to be a regular bearer i. e. heavy yields are not regularly obtained every year. Still the average annual yield is high and the total out-put of copra per tree, per year is more than in var. *typica* or the ordinary variety.

It is an important, economic from useful in crossing as well as for large-scale planting, and is particularly prized for making ball-copra. Popularly the form goes by the name of "Divi" which means island possibly referring to the Laccadive and other islands where it is largely grown and from where the copra of this form is exported. It is occasionally met with in the West Coast gardens.

The size of the nut being small the quantity of kernel utilized for the production of seedling is much less than in any other variety, which means a considerable saving of copra.

The following are the forms of the Dwarf variety viz., var. *nana*:

1. Forma *nana*: The Coco-nino or the baby coconut of the Malay States is described under the Review of Literature.

2. Forma *maldiviana*: This is a popular dwarf form. It has a short trunk and small stature, with small crown and short leaves. The trunk is thin, attaining a height of about 10 to 15 feet with age. Rarely trees are said to live for more than 35 years. Being rather delicate, the variety thrives best in rich soils and under proper conditions of drainage.

On account of its early bearing nature people have a fancy to plant it in back yards of houses and it is now fairly common all over South India, where it is naturalised. The trees come to bearing in about three years after planting and the bunches practically touch the ground in the early stages of bearing and are pretty to look at.

The nuts are small sized and yield a fairly good supply of sweet milk or water in the tendernut. But the copra is thin and of poor quality being leathery. It is therefore not met with on a plantation scale in India. It is also susceptible to the attack of pests and diseases.

Unlike in var. *typica* there are chances for self-pollination due to overlapping of of male and female phases of flowering. The nuts mature in about ten months after pollination i. e., two months earlier than those of var. *typica*. Also the leaflets in the seedlings split much earlier than in the seedlings of the var. *typica*

There are two types in this form. One type has very small narrow nuts with very small quantity of copra. The other has fairly large or medium sized nuts and these should be preferred for planting. Colour forms viz., green, yellow and orange or red and brown are common. These are ornamental. This variety when crossed with var. *typica* (mother) gives rise to progenies with hybrid vigour.

The various forms have been named after the country from which they were originally obtained or where they are largely grown, or after a distinguishing character of the form.

The data relating to the measurable characters of some of the varieties and the forms are furnished in the table appended, which will give a comparative idea of their economic characters. The relative sizes and shapes of the cut and the unhusked nuts are figured in two plates.

A separate key for the identification of the varieties and forms is also included.

Uses of the Varieties and Forms: The uses of the coconut are many and varied. Practically every part of the tree and the nut is put to some use or other. Most books on the coconut deal with the many purposes for which it is utilized. The most important commercial product is the copra or dried kernel. For a planter the main consideration is the production of the best quality of copra at a low cost. The output of copra per tree, per year contributes to the yield of plantations. This depends upon the number of nuts each tree bears in a year and the quantity of kernel contained in the nut. The large size of the nut alone does not count, because in the poor soils of South India, the yield of nuts goes down as the size increases. Based on these considerations the best variety for this country is the var. *typica* or the ordinary tall as also forma *laccadive.* The best planting material has to be rigorously selected from among promising eco-types. The *laccadive* form is in fact better than var. *typica,* but planting material is not available on any large scale. There are only a few trees at the Coconut Research Station, Pilicode and attempts have to be made to multiply the form on a large scale for distribution. The form called *pusilla* or Laccadive Small as it is called popularly, is quite good from the view point of copra production. But as the size of the nut is small, the husking and breaking charges to produce a unit weight of copra may be comparatively higher. It is a form specially suited to make ball copra which is much in demand in certain North Indian markets. The percentage of oil in this form is the highest on record in the Madras collections.

In this context, the famous San Ramon nut (forma *ramona*) is worth considering. It yields twice as much copra of good quality as the var. *typica* proper of India. The yield of nuts also per tree is quite high. If this form can do as well in India as it has done in Philippines it should be easily possible to double our output of copra per acre. But unfortunately, it does not seem to have been given any large-scale trial in this country. Also the Pilicode collections are lacking in this important form. The Nyiur Gading or forma *javanica* of the Malay states, which is an early bearing, heavy yielder appears to be promising on a plantation scale, but it has not yet been given a proper trial in India. It will be worth

while introducing these two forms and study their performance carefully in the different coconut tracts of the country, before contemplating large-scale planting.

From the view point of production of sweet toddy for jaggery (gur) making, the forma *laccadive*, the type Andaman Ordinary and the form *pusilla* are the best yielders. Among the dwarfs, forma *nana* is reported to be a high yielder of juice. For the coir fibre forma *laccadive* is good. For ornamental purposes the dwarf types are the best. They have a short stature and well-filled bunches of nuts with different colours as ivory, orange and apricot, almost touching the ground, and make pretty palms in any garden. Among the ordinary tall variety there are certain trees which produce undersized nuts with thicker shell than the normal and these can be used for carving and shell work.

The different varieties, and forms afford a wealth of material for the coconut breeder whose ideal is an early bearing, high yielding palm with large nuts having superior quality of copra and high percentage of oil. And high yield is the resultant of quick production of flower bunches with large number of female flowers with high setting percentage. The palms should also be resistant to pests and diseases. The breeder's ideal can not be achieved by selection alone, as the different economic characters are distributed among the various varieties and forms and recourse should be had to crossing. Fortunately all the varieties and forms cross freely with one another and they can be utilized to produce new and useful, economic strains.

Introduction of Varieties: Reading of the many varieties one may be naturally inclined to get outstanding varieties from foreign countries. In this respect particular caution should be exercised especially when large-scale planting is contemplated. Because all varieties are not cosmopolitan, which means that they will not do equally well in different countries, as the conditions of soil and climate vary considerably from country to country. Also, it should be remembered that in most varieties cross-pollination is the rule, and the progenies may not breed true to the parent (mother). The object of introducing a new variety should be clear—it may be for increase output of copra, or toddy for jaggery making or for ornamental purposes. It is important to ascertain, before importing foreign varieties, whether similar or nearly similar varieties are already available in the country. A variety which has done well in a foreign country need not do equally well in this country. The

famous San Blas coconut of Panama which is very productive proved disappointing when it was introduced into the Malay States. Most of the imported varieties grown at the Coconut Research Station, Pilicode (Malabar Coast) did not come upto expectations. Many of them were highly susceptible to the attacks of pests and diseases, particularly shoot rot. The size of nut went down and the quality of copra was inferior in many instances. Such risks private planters cannot take and it is best to leave the introduction of foreign varieties to the Coconut Research Stations, which should be in a position to conduct proper trials, and advice the public regarding the best material and variety suitable for planting. Also while introducing new varieties the risk of introducing diseases into a healthy tract should be seriously considered and guarded against.

Summary: The paper deals with the varieties and the forms of the coconut. The information available on the different sorts grown and studied at the Coconut Research Station, Pilicode, and that gathered from publications dealing with the subject from various coconut growing countries is included. A systematic classification of the available material has not been attempted by previous authors, and it is done in this article. The species *Cocos nucifera* Linn, (the coconut) is divided into five varieties, of which only one has been hitherto described. All the varieties fall into two main groups viz., the Tall and the Dwarf. In the Tall groups, three varieties and nine forms and in the Dwarf two varieties and two forms are recognized; these now bear new names, which are mostly after the names of the countries from which they were obtained. The ordinary, tall variety which is typical and cosmopolitan in all the coconut growing countries is called var. *typica*. The many types of local importance found in various countries are not emphasized upon. Descriptions of the varieties and forms and a table of their quantitative characters are given, as also a key for their identification. The importance of outstanding forms like the Laccadive nut, and the famous San Ramon from the Philippines is brought out. The dwarf mutant, here named as var. *javanica* and spoken of as a good performer is recommended for trial. The rare find of a purely male coconut tree which shows the direction of evolution of the coconut species is christened as var. *androgena*. Varieties or forms for special purposes like commercial planting, or for tapping or for ornamental planting etc., are mentioned. The possibility of evolving new and economically useful strains by hybridization is indicated.

It is, however, not claimed by the authors that the work of study and classification of the many varieties and forms of the coconut is either complete or comprehensive, and much remains to be yet done on the subject.

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KEY FOR THE IDENTIFICATION OF COCONUT VARIETIES AND FORMS

Varieties

A. Inflorescence unbranched or rarely with one or two small spikes ... var. *spicata.*

A. A. Inflorescence normal and always branched

B. Tall, late bearing palms

C. With both male and female flowers ... var. *typica.*

C. C. With only male flowers ... var. *androgena.*

B. B. Dwarf and early bearing palms

D. Vigorous palms bearing in 4 years ... var. *javanica.*

D. D. Delicate palms bearing in 3 years ... var. *nana.*

Forms of var. *typica.*

A. Nuts very small (about 1000 cc. in volume) and very many in a bunch—even 100 or more .. *pusilla* (Laccadive small)

A. A. Nuts not small

B. Nuts very large (7000 c, c.), majestic palms, copra content low and quality inferior ... *gigantea* (Andaman giant).

B. B. Nuts medium large (about 6000 c. c. or less)

C. Nuts about 6000 c. c., copra superior and quantity high—about 10—12 oz. per nut

D Yield of nuts per tree, per year, about 100 even ... *ramona.*

D. D. Yield of nuts low about 35 per tree, per year ... *Kappadan.*

C. C. Nuts 4000 c. c. in volume or less

E. Trunk robust—90—100 cms. in girth

F. Percentage of oil in copra high (74) ... *siamea.*

F. F. Percentage of oil in copra low (66—69)

G. Female flower production (annual) very high (744) ... *nova-guineana.*

G. G. Female flower production (annual) low (220) ... *malayensis.*

E. E. Trunk of medium girth (73—83 cms.)

H. Copra thin (0·82 cms.) and % of oil in copra low 66 ... *cochin-chinensis.*

H. H. Copra thicker (1·2—1·3 cms.) and percentage of oil high 72 ... *laccadive.*

TABLE

The quantitative characters of the coconut varieties and forms—Coconut Research Station, Pilicode

Serial Number	Variety or Form	Age of tree	Age at first flowering	Girth of trunk at base	Number of leaves in the crown	Length of leaves	Length of petiole	Mean production of female flowers per year	Highest yield of nuts recorded per tree in a year	Quantity of water in tender nut	Weight of unhusked nut	Weight of husked nut	Volume of unhusked nut	Volume of husked nut	Mean thickness of meat	Thickness of husk (Middle of husk)	Mean copra content per nut	Percentage of oil in copra (Ether extraction)	Yield of juice per day, per palm	Serial No.
		Year.	Year.	Cms.		Cms.	Cms.			C.C.	Grams.	Grams.	C.C.	C.C	Cms.		Cms.	Grams.	C.C.	
1.	Var. *typica* ...	25	10	73	34	594	129	320	80	300	1134	454	2264	465	1·21	2·45	159	71 6	899	1
2.	Forma *laccadive* ...	16	4	76	39	533	137	648	160	290	1219	510	2170	500	1·25	3 04	157	72·2	1758	2
3.	,, *pusilla* ...	16	6	91	30	526	144	522	400	261	709	225	1200	250	1 12	1·40	60	75 3	1234	3
4.	,, *Kappadan* ...	...	..	...	...	...	...	...	35	894	1929	193	5750	1135	1·48	4·30	332	61·7?	...	4
5.	,, *siamea* ...	15	10	93	32	487	132	175	59	841	1899	737	3915	855	1·10	3 60	221	74·3	41	5
6.	,, *gigantea* ...	16	8	114	38	579	152	199	35	500	1786	878	6900	800	1·29	6·30	180	67·1	Nil	6
7.	Type Andaman Ordinary ...	16	7	91	31	533	144	451	40	377	1701	552	3640	700	1 28	3·70	170	67·1	1339	7
8.	Forma *nova-guineana* ...	15	7	91	31	579	152	744	93	348	1105	368	3600	580	1·12	5·20	213	65·6	541	8
9.	,, *malayensis* ...	15	10	91	29	465	114	220	44	609	1616	935	3200	996	1·22	2·40	200	69·0	680	9
10.	,, *cochin-chinensis* ...	15	8	83	30	609	137	208	88	464	1162	652	2340	750	0·82	2·30	140	66·2	758	10
11.	,, *maldiviana* ...	15	5	71	27	396	106	140	86	348	623	317	1053	450	0 96	1·55	84	66·2	310	11
12.	Var. *spicata* ...	8	4	78	30	513	134	978	25	210	510	283	1950	500	1·25	2·10	141	70·6	Nil	12

(Note: 1 oz. — 28·35 grams): (1 Fluid ounce — 28·41 C. C.)

Varieties and Forms of the Coconut

PLATE 1

VARIETY AND FORMS OF COCONUT

NARAYANA & JOHN

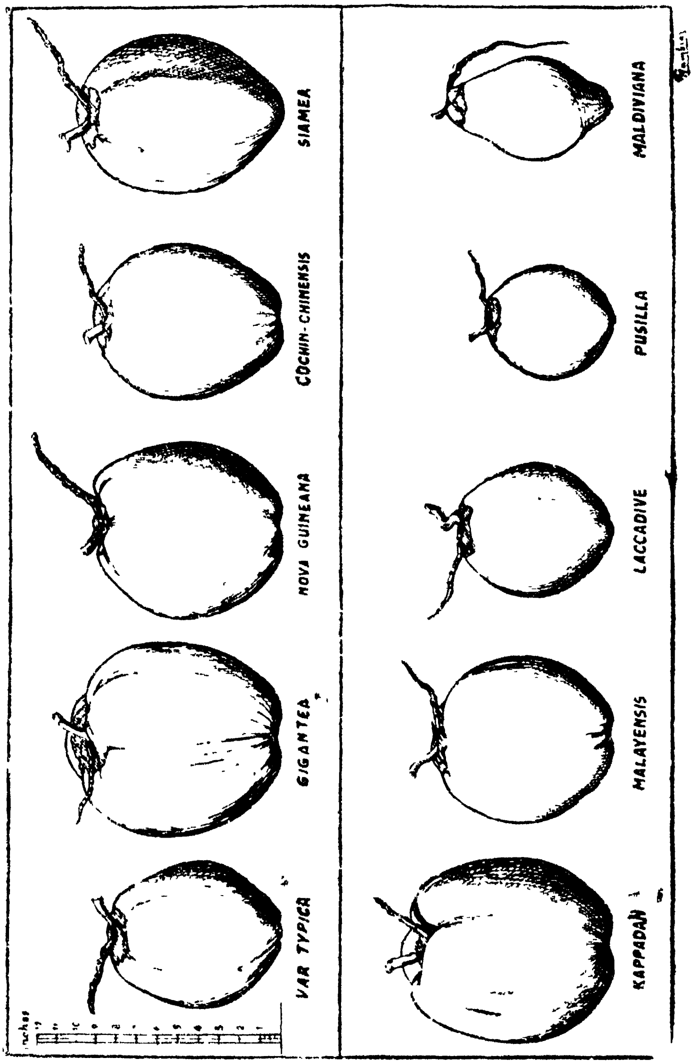
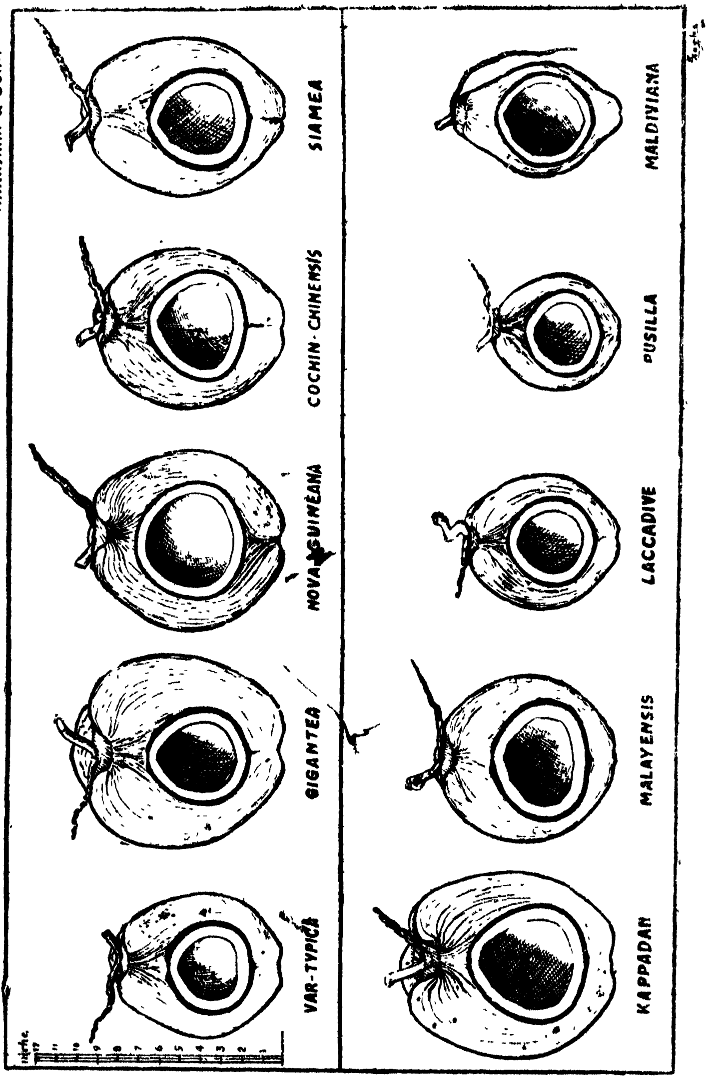


PLATE 2

VARIETY AND FORMS OF COCONUT (CROSS SECTION)

NARAYANA & JOHN



Turmeric Survey

By

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Turmeric is cultivated in garden lands as well as wetlands to the extent of about 3,100 acres in Coimbatore District in the vicinity of either a river or its channel. The three important taluks growing turmeric are Bhavani, Gobichettipalayam and Erode which constitute about 850 750 and 1,500 acres respectively. This area is not constant and it varies with the fluctuations in the price of turmeric in the Erode market. The crop is cultivated in about 2,000 acres in Karur taluk (Thiruchirapally District) and a small area in Salem District and the entire produce is marketed in Erode which exports the cured product to all places in the Presidency and also to places outside India through commission agents in Calcutta, Karachi, Colombo, Bombay and Madras. The produce from Valliyampalayam area in Gobichettipalayam taluk is valued highest and considered to be the best among the produce received from different centres. The crop is valued as a dye-stuff in the foreign market apart from its demand as a condiment and use for medicinal purposes. The cultivation and yield vary with the nature of the soil, irrigation, water, kind and availability of manure and also upon the skill of the cultivator.

Soil: Turmeric is mainly cultivated in well-drained red alluvial soils with ample facilities for the application of silt having plenty of organic matter, as Bhavani river silt. But it is also grown in heavy black soils as in Paruvachi in Bhavani taluk and Pasupathipalayam in Karur taluk. In heavier soils plenty of organic matter is applied to permit development of rhizomes by aiding drainage.

Rotations: No uniform rotation is followed in this tract in the cultivation of the crop. In the garden lands of Gobichettipalayam taluk the common rotation is as follows :—

1. Turmeric (May—June), 2. Fodder Cholam (February—April), 3. Arisi Cumbu (May—July), 4. Late Ragi (July—October), 5. Late Cotton (October—March), 6. Turmeric (May—June).

In Bhavani taluk either the above rotation or the following is adopted :—

1. Turmeric (May—June), Fodder Cholam or Panivaragu (February—April), 3. Arisi cumbu (May—July), 4. Ragi (July—October), 5. Sunhemp (Green Manure) (February—April), 6. Turmeric (May—June).

In wet lands of Erode taluk the usual rotation that is followed is as below :—

1. Turmeric (May—June), 2. Fodder cholam (February—April), 3. Samba Paddy (July—January), 4. Sunhemp for green manure crop (February—April), 5. Turmeric (May—June).

Season: The season for sowing the crop ranges from May—July depending on the receipt of water in the channels. In places where lift irrigation is done from Bhavani river like Kadayampatti, Thippichetti-palayam and Oricheri they are all planted earlier. But in Erode and Bhavani taluk planting is done rather late.

Preparatory Cultivation: After the harvest of the previous crop the land is ploughed under optimum moisture conditions not less than six times until a fine tilth is obtained. As previously mentioned if a thick-sown crop of Sunnhemp is in the field, raised for green manure the tops are cut to facilitate subsequent ploughing in. The seed rate used is about 60 lb. per acre. Generally country ploughs are used but big ryots who are having stronger animals also use various mould-board ploughs like Cooper 11, 25 and P. S. G. 10.

Manures and manuring: As the value of silt in the cultivation of this crop is well appreciated by all turmeric cultivators there is severe competition for securing the same. To the extent availale silt is applied up to 150 cart-loads per acre. In places like Appakudal and Vempathy in Bhavani taluk the silt accumulated in the tanks in the respective villages is utilised as manure for turmeric. These tanks receive their water supply from jungle streams passing through Bharghur hills and hence carry with them a lot of vegetable matter. In places where the soil is heavier, groundnut husk, rotten palmyra leaves from old roof-tops, kolinji plants cut into bits, cumbu straw which becomes unfit for cattle fodder are also used. Cattle manure, muncipal rubbish and nightsoil compost are also used at 30—50 cart-loads per acre. Ryots apply heavier doses of manure in light red soils as they are considered to be hungry soils while the heavy clay soils which are considered more fertile receive a lesser dose of manure. It is said that sheep-penning leads to more of vegetative growth and less of yield in turmeric. Some of the ryots in Sinnapuliyur of Bhavani taluk gave their opinion that cattle manure without the admixture of silt in heavier clay soils leads to the attack of termites. Growing sunnhemp as a green manure crop 1½ months prior to sowing of turmeric and ploughing it in at flowering stage is becoming more and more popular and this lessens the quantity of manure applied to the crop by about 25 cart-loads per acre. In Bhavani taluk some ryots have used groundnut cake at 480 lb. per acre and ammonium sulphate at 112 lb. per acre and obtained very good yields. In Karur taluk on heavier clay soils, an application of 750 lb. of castor cake and 112 lb. of ammonium sulphate per acre did not give any appreciable increase in

yield over the local custom of applying organic manure. In Vellalapalayam village of Gobichettipalayam taluk, superphosphate has been reported to give good yields. In Erode taluk ryots have realised the value of municipal compost and on account of the keen competition it is found to be costlier than cattle manure. In general it is noticed that the value of organic manures and addition of silt is uniformly appreciated by turmeric cultivators in this district.

Seeds and Sowing: The seed material used is always selected from the previous year's crop. They are sold in terms of basketfuls or "Sadus" the capacity of the basket varying from 16 Madras measures to 32 Madras measures. In Karur the capacity of one "Sadu" is only 16 Madras measures weighing 60 lbs. Twenty-eight such "Sadus" are required per acre for sowing. In Erode taluk one Sadu is 32 Madras measures and in Bhavani it is 24 Madras measures In all other taluks except in Gobichettipalayam the harvest of the crop of a small portion is left for seed purposes. Just after a month after the removal of the main crop the stalk of the seed material crop are cut and irrigated twice at fortnighly intervals. Then the seed crop is dug out and the rhizomes collected and preserved on dry sand and covered by dry leaves of turmeric. Only healthy ones free from diseases are selected for seed purposes. Rhizomes which are too thick otherwise called "Periyanadam" are rejected because they shrink very much after being cured. Both the round ones as well as the fingers are used as seed material, but they are sown only separately. Though the round ones are sold at Rs. 30/- less per ton than "fingers" in Erode market the ryots still use only a small percentage of the same as seed material. The ryots could not satisfactorily explain as to why the "round" ones or the mother rhizomes which are cheaper than the "fingers" should not be used as seed material. Ryots in Gobichettipalayam taluk are of opinion that "round" ones are able to produce vigorous growth of plants but give less yield. In Bhavani and Erode taluks the ryots believe that round ones produce vigorous plants and also result in good yield, but the seed material cannot be preserved for a longer time as in the case of "finger" rhizomes. In Karur taluk the ryots say that the round ones are able to come up well in heavier soils and hence suitable only for such soils. The majority of ryots seem to be of the idea that round ones may be preferred to "fingers" as seed material, but the matter needs investigation. About 1500 - 1800 lb. of seed material will be required per acre.

Method of Sowing: In well drained soils of Bhavani and Gobichettipalayam taluks planting in beds is preferred to planting in ridges. It is found that the number of plants in bed system is always greater than when planted in ridges and according to the ryots the total yield per acre increases as the number of plants increases up to a certain limit. In Erode and Karur taluks, when the soils are either heavier or irrigation is done by

direct flow from the channels, the size of the beds varies with the source of irrigation. Usually, they are 8' by 8' feet. In the case of ridges it is 1½' to 2' in lighter soils and 2—2½' in the case of heavier soils. When the ridges are formed 2½' apart they are bigger in size and rhizomes are planted in 2 rows on both sides of the reidges while in smaller ridges they are sown only in one row at the crest. The method of sowing is almost the same in all places except in Sinnadharapuram where it is simply dibbled by the hand in the ridges 1 foot apart. In other cases a cut is made on the ridges with a mammoty and is slightly lifted and the turmeric fingers broken to 2" bits thrown into the pit one at a time so that when the mammatty is taken out the soil will cover the seed material completely. The distance between the seeds in the ridges or in the beds will be about 10 inches. Thus for sowing 1 acre 5 men to dig and 5 women to sow the seed-rhizomes and 2 men to level or reform the ridges respectively will be required.

Other crops sown as mixtures: Turmeric is rarely raised as a pure crop. Castor is commonly grown as a minor crop just for giving shade to the turmeric crop and a handful of seeds is sown here and there soon after the turmeric is planted. The other crops which are also grown as a mixture are the following:— Cumbu, Ragi, Maize, Onions, *Sesbania egyptiaca* and *Colocasia.* After turmeric rhizomes are sown, cumbu seedlings or ragi seedlings are planted one foot apart in September when the rhizomes begin to have vigorous growth. In the case of maize the seeds are sown 1½ to 2 feet apart and the cobs are sold while green and the entire crop is removed within 80-90 days after planting. On the same day or a day after the sowing of turmeric, onions are planted on the ridges on both sides 1'—1½' apart and 600 lbs. of seed bulbs are generally required per acre. It is also usual to plant seedlings of chillies, brinjals, tomatoes and other vegetables on the bunds of main channels here and there just to give a subsidiary income to the ryot for meeting the cultivation expenses. Some of the ryots feel that by growing these minor crops as a mixture the main yield is not affected while others believe that the yield of the main crop is reduced thereby. Adverse effects are reported to be variable with different crops. For instance the cultivation of maize is reported to reduce the yield of turmeric considerably while onion does not affect it so much.

Irrigation: Ryots always feel that maximum yields of turmeric are obtained in well-drained soils and that too under lift irrigation. In places where water is irrigated by direct flow there is a tendency for over-watering and the soil becoming ill-drained and hence according to the ryots a lower yield is got in such places. Irrigation is done at longer intervals in the earlier stages of the crop and become more frequent, even twice a week from the fourth month after planting, when the rhizomes begin to make vigorous growth.

After-cultivation: Weeding with a hand hoe twice, the first, two weeks after sowing and the second 1½ months after sowing are done. The crop is hoed with mammoties and plants earthed up once, after the harvest of minor crops like cumbu, maize, ragi, or onions and another after the fourth month when the rhizomes begin to grow vigorously.

Harvest: The crop becomes ready for harvest eight months after planting when the rhizomes and the leaves are fully mature and the leaves show a tendency to turn brown. The stalks are harvested flush to the ground level soon after irrigating the crop. Subsequently two more irrigations are given once in two weeks and the rhizomes are dug out either by means of a mammoty or a tool called "Kothu" in Tamil. About 40 men will be required for digging the entire produce from an acre and 120 women to clean the rhizomes free of mud, to remove the rootlets, and also to separate the mother rhizomes from the stalk, to sort out fingers and rounds and put them into separate heaps.

The turmeric thus harvested is boiled in rectangular pans made of 12 G. M. S. plates. They are $3' \times 2' \times 1\frac{1}{2}'$ in size usually, though the size varies slightly in some places. Rectangular pits 3' in depth and of the same dimensions as the pans, are dug and they form the hearths on which the boiling is done. The pans are placed on two iron plates, generally worn-out cart tyres, placed lengthwise on the hearth on the borders. Loppings purchased on contract for the purpose are used as fuel. The pan is filled up with turmeric to be cured, a bucket full of cowdung water and equal quantities of fresh water are added and the surface is covered by means of a moist gunny. Castor stalks and *Sesbania egyptiaca* twigs got from the subsidiary crops in turmeric are also used as fuel for boiling turmeric rhizomes. When white fumes are seen from the gunny or when a broomstick passess into the rhizomes by mere pressure, it is taken that the boiling is complete and the pan is immediately removed and emptied on the threshing floor. The heaps are then spread uniformly, to be dried in the sun for about ten days until the whole stuff is completely dried. A pan can hold about 150 lbs. of green turmeric and when cured and dried it will weigh about 35 lbs. Four men with two pans can cure to get about 7 sattais or 1960 lbs. of cured stuff in one night, working for 6 hours.

Polishing: This is done either by means of a basket or by means of turmeric polishers invented by the Department. New bamboo baskets of 16 Madras measures capacity are hung to a horizontal post just above our head by means of a rope tied at the rims in 2 places in a line passing through the centre. Dried turmeric is taken about two-thirds full in the baskets, a few small stones are also added and 2 women one on each side standing and holding the baskets shake it up and down alternately so that the turmeric rhizhomes coming in contact with the rough surface of the basket as well as the stones get themselves polished. Two women working thus for 8 hours can polish 420 lbs. of cured stuff per day. In

the case of a turmeric polisher 5 men can polish 10 "pothis" or 2,800 lbs. of cured rhizomes in a day. Of course polishing by means of the improved polisher is cheaper and more efficient but the demand for the machine is so great that all are not able to procure the same. The Co-operative Sale Societies, and the Agricultural Depots in taluks are issuing the same on hire to the ryots but the number here is too inadequate. On enquiry it is seen that many ryots are prepared to purchase the implement for themselves.

Marketing: The polished stuff is packed in gunnies without being exposed to the sun lest the polish be affected. Erode is the main marketing centre for turmeric. The entire stuff of Coimbatore District Karur, Salem and sometimes produce from Cochin State are all exported from Erode to various places. There are nine wholesale merchants who purchase the turmeric and sell it to various merchants within the country and also export it to foreign countries through commission agents at Karachi, Bombay, Calcutta, Madras and Colombo. There are a number of commission agents at Erode and Karur who undertake to sell the ryots' produce to the merchants at Erode on a commission of 0–1–0 per rupee worth of produce sold. The Co-operative Sales Society at Gobichettipalayam with its branch office at Erode also undertakes to do the same on a commission of 0–0–10 per rupee but the ryots prefer to sell their produce through private commission mundies than through the Co-operative Sales Society for the following reasons:

1. The private mundies advance crop loans to the ryots at the rate of Rs. 600 — 800 per acre of turmeric crops to be raised without much difficulty or formality while the Society cannot pay more than Rs. 300/- and that too not so easily.

2. Though the commission is more and ultimately other expenses by way of presents in kind are always more in a commission mundy, yet the ryots find it easier and more convenient. A quick disposal of the produce in consultation with the ryots tempts the ryots to sell the produce through these commission mundies in preference to Co-operative Sales Societies.

The following are the various stages in the marketing of turmeric by a ryot through a commission mundy at Erode.

1. The ryot takes the produce to the Commission mundy packed in gunnies already supplied by the merchant free of hire, and stores it in the mundy.

2. A handful of the sample is taken by the commission agent and various merchants are approached along with the producer and he finds out the price at which the particular stuff could be sold. If the ryot is prepared for the price offered by the merchant, the whole thing is sold to the merchant at that price.

3. Before the weighment is made the round ones that may be found mixed with finger rhizomes are all picked out on a contract rate of a few annas per bag of 140 lbs. and the stuff is weighed. If any stones are found mixed with turmeric the weight of stones found in one maund is deducted at a flat rate from the entire weight of produce.

4. About 40 to 50 lbs. of turmeric for every 2,800 lbs. of produce will be given free towards the *Kalas* charges though the Commission agent also gets a portion of the same.

5. While the bags are being taken into the mundy or loaded in the cart the fingers dropped here and there will all be collected and stored by coolies specially employed by the Commission Agent and over which the ryots do not have any claim.

6. When the total value is worked out in addition to the usual commission at 0-1-0 per rupee, other deductions like "mahimai" "Dharmam" etc., are also made at a few annas per 280 lbs. of turmeric sold.

In the case of the Sales Society, in addition to the Commission they charge 0-2-0 per "sattai" or 280 lbs. towards kalas charges. There are no other deductions made. The round ones are purchased by the Commission Agents alone, always at a price Rs. 30/- per "sattai" less than that of finger rhizomes. Fingers which are uniformly thick, smooth, long and cylindrical, and which when broken, break with a sound and show a dark yellow colour are considered best and fetch the maximum price.

Preparing for Export: The produce purchased by the wholesale merchant at Erode is further prepared for the market. Nearly 75,000 bags of turmeric are being purchased at Erode by the merchants out of which 60,000 bags are from Erode, Bhavani and Gobichettiplayam taluks. About 12,000 bags are being received from Karur and 3,000 bags from other districts. The quality of the produce is different from place to place and one can easily identify the produce from a particular locality. For instance, the produce from Gobichettipalayam taluk will be long round, branched, smooth and breaks with a metallic sound. The Karur stuff is dull in colour. short, bent and always fetches Rs. 30/- per "pothy" of 280 lbs. The turmeric fingers from Salem are, thick, slightly shrunken and long. Alwaye turmeric is short, straight, sharp at both ends and is said to be superior for the manufacture of dye. But all these qualities are not always constant. Depending upon the demand from particular markets the produce from particular localities are sold at a high rate. For instance though Salem produce is purchased at a relatively cheaper rate at Erode it is sold in some years at Karachi for highest prices. Though the rounds are always purchased Rs. 30/- less per "pothy" than fingers, yet there have been years when the former has been, sold for foreign countries at a higher price than the latter.

So also different markets require different kinds of treatments of the stuff purchased by the merchants at Erode. For instance the produce sold at Karachi and Bombay has to be dry-polished for a second time in a power-driven polisher before it is exported and packed in gunnies of 96 lb. nett. When selling the produce through Calcutta the produce is given a colouring. Two Madras measures of turmeric powder got by powdering round rhizomes is mixed in 20 gallons of water and the coloured solution is sprinkled over turmeric taken in a basket and shaken constantly when the entire produce gets completely coloured. They are dried under shade and packed in gunnies of 164 lb. nett. By the former method there is a decrease in weight of 7 lb. for every 280 lb. and by the latter method there is an increase in weight by about 14 lb. per 280 lb. For turmeric sent to other places within India no other treatment is given. Though there are merchants at Erode who have ample facilities for trading with merchants in foreign countries they are only selling the produce through commission mundies at Karachi, Bombay, Calcutta etc., paying Rs. 2/- to Rs. 2—8—0 per Rs. 100/- because they are not able to supply to the foreign merchants at a specified time large consignments of quality for the following reasons:

1. The produce of different ryots varies in quality and produce of the same quality is not received all at one time.

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4. Facilities are not available for keeping the produce for a longer time in the godowns without being attacked by insects.

The ryots who are not able to sell their produce in the same year generally preserve the produce underground.

Pests and Diseases: The damage caused by insects to turmeric is negligible, but the leaf-spot disease which in some cases does great havoc is very important and worth mentioning, According to ryot is the disease is severe in years of drought. The ryots have realised that use of healthy seed material always produces encouraging results.

Land Tenure System: In Coimbatore District, when turmeric is cultivated in garden lands on lease system, the tenants have to pay at 5—6 pothies (280 lb. for pothy) of turmeric per acre per year or Rs. 300/- per acre. In wetlands in Erode taluk 6 to 8 pothies (192 Madras measures per pothy) of paddy per acre per year is common. The yield of the crop is about 18 sattais or 3,240 lb. per acre in Gobi, 4,000 lb. in portion of Bhavani and 2,7000 lb. in Erode and other places.

Cost of cultivation for one acre of turmeric in Coimbatore District:

	M.D.	W.D.	C.D.	B.D.	Rs.	A.	P.
Preparatory Cultivation:							
Ploughing 6 times	8		4	8	24	0	0
Manures and Manuring:							
Carting Farmyard manure and Silt from the yard. ...	6			4	14	0	0
Spreading manure. ...	4				4	0	0
Covering manure. ...	1½			1½	4	0	0
Cost of 50 cartloads of farm-yard manure at Rs. 4 per cartload. ...					200	0	0
Cost of 100 cartloads of silt at 0—8—0 a cartload. ...					50	0	0
Seeds and Sowing:							
Forming ridges and furrows with country plough and re-forming with mammoties. ...	5		1¾	1	7	0	0
Cost of 20 Sadus of seed rhizomes at Rs. 15/- per Sadu					300	0	0
Sowing and reforming ridges	8	4			10	0	0
Dibbling onions—8 bags at Rs. 6/- per bag. ...		16			56	0	0
Irrigation:							
40 irrigations at Rs. 12/- per irrigation. ...					480	0	0
After Cultivation:							
Weeding by means of hand hoe. ...	20				10	0	0
Mammoty weeding and earth-ing up. ...	24				24	0	0
Harvesting onions. ...		40			20	0	0
Cutting turmeric stalks. ...		4			2	0	0
Harvesting rhizomes. ...	20	60			50	0	0
Curing turmeric. ...	8	3			9	8	0
Watch for 10 days. L. S.	10				5	0	0
Hire on boiling pan at 0—8—0 for three days. ...					1	8	0
Polishing. ...	10				10	0	0
Hire charges at Re. 1/- for 2 days. ...					2	0	0

Marketing:	M.D.	W.D.	C.D.	B.D.	Rs.	A.	P.
Transporting to market at 0—8—0 per bag for 40 bags.					20	0	0
Kalas at 0—2—0 per bag.					5	0	0
Lease 5 pothies of turmeric at Rs. 140 per pothy. ...					700	0	0
Fuel ...					40	0	0
					2,048	0	0

Receipts:

Cost of 20 sattais of turmeric at Rs. 140/- per pothy. ...	2,800	0	0
Cost of 20 bags of onions at Rs. 6/- per bag.	120	0	0
	2,920	0	0
Net profit per acre.	872	0	0

The hire for 1 pair of bullocks is charged at Rs. 3 per day.

The hire for 1 man per day is charged at Rs. 1/-.
Do. 1 woman or boy Do. Re. 0—8—0

On an exhaustive survey of the crop, the following points are suggested for investigation:

Cultural:

(a) Whether it is necessary to leave a portion of the crop in the field itself a month or two more after the harvest of the main crop for purposes of seed.

(b) Whether there is any difference in yield or quality of turmeric grown from these 2 kinds of seed material viz., rounds and fingers.

(c) Investigations into the proper method of preserving round seed rhizomes so that the cheaper stuff can be used as seed material.

(d) The optimum spacing between the seed material sown in the field to get the maximum yield.

(e) The relative bad effects of growing various crops as a mixture with turmeric and finding out the most suitable crop that could be grown with the least harmful effects.

(f) How for the method of sowing could be done with minimum expenses and whether dibbling behind the plough as is done in Guntur could not be followed profitably in Coimbatore District also.

(g) The quality of water that is suitable and the frequency of irrigation at different stages of the crop and the optimum quantity of water necessary to give the maximum yield may be investigated.

(h) The possibility of economising on harvest charges by using bullock power for digging out the produce instead of doing it by manual labour.

Varietal:

To examine the possibility of producing a stuff suitable to the foreign market by proper selection from the produce collected from various places.

Manurial:

1. Relative value of different green manure crops that could be usefully advocated for turmeric, to increase yields.

2. Suggestion of a suitable rotation so that the fertility of the soil may be maintained.

3. Giving better facilities for ryots to get silt and compost from Municipality for their turmeric crop so that better yields could be obtained at a lesser cost.

4. Since manuring is likely to influence quality it will be interesting to find out suitable manures to improve the quality of crop.

General:

1. The Co-operative Sales Societies should be made more easily accessible to the ryots to sell the produce, by relaxing the formalities in the issue of crop advance loans.

2. These Co-operative Sales Societies establish contact with foreign merchants, to cut down the number of middlemen.

3. Many ryots have not got adequate facilities for preserving cured turmeric and as such have to hurriedly sell the produce to avoid loss through insect pests. Provision of proper storage facilities should be seriously considered in the Society godowns.

4. Every village Co-operative Society should have a power-driven turmeric polisher and the entire produce of the village should be polished in a common place.

5. The possibilities of other methods of curing the stuff, like deyhdration also need investigation.

THE THIRTY-SECOND COLLEGE DAY AND CONFERENCE

The thirty-second College Day and Conference organised by the Madras Agricultural Students' Union was held this year from 30th July to 2nd August 1949 under the distinguished presidency of the Hon'ble Sri P. S. Kumaraswami Raja, M.L.A., Premier, Government of Madras. The Hon'ble Minister for Agriculture Sri A. B. Shetty, M.L.A. was also kind enough to be present and open the Agricultural Exhibition arranged in connection with the College Day and Conference. Sri R. M. Sundaram, M.A., I.C.S., Director of Agriculture, Madras, the regional Deputy Directors of Agriculture, and nearly all the District Agricultural Officers of the Department were present and participated in the Conference proceedings.

The Conference commenced at 10-30 A.M. on Saturday the 30th July 1949 with a welcome speech by the Principal Sri M. C. Cherian. The Secretary of the Union then moved the following resolution "The Madras Agricultural Students" Union Coimbatore places on record its profound and deep sense of sorrow at the tragic end of Sri V. C. Vellingiri Gounder-keen Agriculturist in Coimbatore District and an old patron of the Union. The resolution was passed, all those present standing in silence for two minutes.

The Secretary, Sri K. Meenakshisundaram, then read out the messages received by the Union, from many of its well-wishers, followed by the reading of the Annual Report of the Managing Committee for the year 1948-49. Prizes were then distributed by the President, to the various prize-winners of the Agricultural College during the academic year ending June 1948.

The President then delivered his address, where he made an eloquent appeal to all to bend their energies towards solving the present food crisis. The Hon'ble Minister for Agriculture followed this speech by the Premier, by another thought-provoking address before declaring open the Agricultural Exhibition at 12 noon.

The Second Session commenced at 2 P. M. with Sri T. S. Avinashilingam Chettiar, M.A., M.L. M.L.A. in the chair in the unavoidable absence of the Premier and the Director of Agriculture Sri. R. M. Sundaram, opened the discussion and a number of very interesting papers were then read as part of a Symposium on "Transmission of Research-How best to translate the results of Research into General practice". After eight papers had been read, the subject was thrown open for discussion and the view points of the general public were expressed by Sri V. C. Palaniswami Gounder, Sri V. C. Subbiah Gounder, Sri P. S. Balarama Raju and Sri C. L. Soundararajan. Sri Avinashilingam Chettiar then wound up the first day's proceedings with a short but eloquent speech.

On the night of 30th July, the Union arranged for a Variety Entertainment. On Monday the 1st August the Conference was resumed at 8 A.M. and a number of papers were read. Owing to the large number of papers that had to be presented within a limited time, all speakers were requested to give a condensed talk on salient points without reading their papers in full. This had the effect of not only saving time but also of keeping the disscussion to the essential points. The public session of the Conference came to an end at 12 noon on Monday the 1st August, with the President's concluding remarks ; the subsequent two sittings - one between 2-4 P.M. on Monday the 1st August and another between 10 A.M. to 1 P.M. on the 2nd August, being in the nature of a Departmental Officers' Conference, for discussion of specific issues and difficulties encountered in the implementation of the Grow-More-Food Campaign in daily practice. On the evening of the 2nd, the Union conducted the Annual College Sports and Tea. The Championship Cup for the best athelete was secured by Sri V. N. Lakshmanan of class II. The Hon'ble Minister for Agriculture, A. B. Shetty was present during all the sessions and evinced keen interest in the proceedings of the Conference.

Principal's Welcome Speech.

The Hon'ble Premier, the Hon'ble Minister for Agriculture, Director of Agriculture.

Ladies and Gentlemen,

As Principal and President of the Madras Agricultural Students' Union it is my proud privilege to extend to you all a cordial welcome to this - the thirty-second College Day and Conference. Our grateful thanks are due to the Hon'ble Premier - Sri Kumaraswami Raja - for graciously accepting our invitation to preside over this function. The very fact that he found time to come to us amidst his many pressing engagements, shows how deeply interested he is in matters pertaining to the welfare of the ryot. We are also thankful to Sri. A. B. Shetty, our Minister for Agriculture for consenting to declare the Exhibition open. As an agriculturist himself, he can speak with authority on matters agricultural and there is no doubt that with him at the helm of affairs the destiny of the Department is in safe hands. We also express our thanks to Sri. R. M. Sundaram, Director of Agriculture, for his great interest in the affairs of the Union. Prior to his appointment as Director he has been connected with the Agricultural Department as Additional Secretary and therefore has a good knowledge of the problems confronting us.

The food problem is the most important problem of the day. The Prime Minister of India in his message to the Nation has appealed for co-operation in the drive for food production which is "ultimately a war

against poverty and ignorance, against malnutrition and high prices". The Director of Agriculture has at the recent press interview at Madras indicated the several measures which are being taken up for increasing food production. We can assure the Premier and the Minister for Agriculture that the officers of the Department will do their best to tackle the food problem.

The subject of last year's symposium was " The food crisis and its solution ", when the different Research Officers gave an account of the work done by them with a view to increasing food production by different methods such as breeding for high yielding strains, proper manuring, application of cheap and efficient ways of combating pests and diseases, etc. It is not enough if better strains are produced and better methods of control of pests and diseases are devised but the information obtained has to be taken to the very doors of the agriculturist. This year's symposium is on " How best to translate the results of research to general farming practices". In the papers which will be read at the conference an attempt is made to review the present methods of propaganda and see how far these can be improved upon. It is hoped that as many members as possible will take part in the discussion and give us the benefit of their experience.

An Exhibition has also been arranged for this occasion in the Research Institute and the Central Farm. This gives an opportunity to the public to study the nature of the work done by the Department. Arrangements have been made to explain the exhibits to those who visit the Exhibition.

This year, the British Information Services have kindly consented to loan some of their films on agricultural topics for display here. I am sure that films of this nature will be of great help in educating the public in agricultural matters.

The results of the B. Sc. (Ag) Degree Examinations have been very satisfactory. Out of the 106 candidates including reference students who appeared for the Final Examination 104 have come out successful. I take this opportunity to congratulate them and particularly Sri A. Appa Rao, for winning three medals – Robertson medal for proficiency in Agriculture, Kees medal in Agricultural Chemistry and Raghunatha Rao Medal for the highest number of marks in practical agriculture in all the terminal and final Examinations.

In this connection, I may be permitted to say a word about our Agricultural Graduates. The B. Sc. (Ag) is a three-year course where intensive training both in theoretical and practical agriculture and allied subjects is given. The University of Madras recognises this degree as

3. Before the weighment is made the round ones that may be found mixed with finger rhizomes are all picked out on a contract rate of a few annas per bag of 140 lbs. and the stuff is weighed. If any stones are found mixed with turmeric the weight of stones found in one maund is deducted at a flat rate from the entire weight of produce.

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Preparing for Export: The produce purchased by the wholesale merchant at Erode is further prepared for the market. Nearly 75,000 bags of turmeric are being purchased at Erode by the merchants out of which 60,000 bags are from Erode, Bhavani and Gobichettiplayam taluks. About 12,000 bags are being received from Karur and 3,000 bags from other districts. The quality of the produce is different from place to place and one can easily identify the produce from a particular locality. For instance, the produce from Gobichettipalayam taluk will be long round, branched, smooth and breaks with a metallic sound. The Karur stuff is dull in colour. short, bent and always fetches Rs. 30/- per "pothy" of 280 lbs. The turmeric fingers from Salem are, thick, slightly shrunken and long. Alwaye turmeric is short, straight, sharp at both ends and is said to be superior for the manufacture of dye. But all these qualities are not always constant. Depending upon the demand from particular markets the produce from particular localities are sold at a high rate. For instance though Salem produce is purchased at a relatively cheaper rate at Erode it is sold in some years at Karachi for highest prices. Though the rounds are always purchased Rs. 30/- less per "pothy" than fingers, yet there have been years when the former has been, sold for foreign countries at a higher price than the latter.

So also different markets require different kinds of treatments of the stuff purchased by the merchants at Erode. For instance the produce sold at Karachi and Bombay has to be dry-polished for a second time in a power-driven polisher before it is exported and packed in gunnies of 96 lb. nett. When selling the produce through Calcutta the produce is given a colouring. Two Madras measures of turmeric powder got by powdering round rhizomes is mixed in 20 gallons of water and the coloured solution is sprinkled over turmeric taken in a basket and shaken constantly when the entire produce gets completely coloured. They are dried under shade and packed in gunnies of 164 lb. nett. By the former method there is a decrease in weight of 7 lb. for every 280 lb. and by the latter method there is an increase in weight by about 14 lb. per 280 lb. For turmeric sent to other places within India no other treatment is given. Though there are merchants at Erode who have ample facilities for trading with merchants in foreign countries they are only selling the produce through commission mundies at Karachi, Bombay, Calcutta etc., paying Rs. 2/- to Rs. 2—8—0 per Rs. 100/- because they are not able to supply to the foreign merchants at a specified time large consignments of quality for the following reasons:

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Cost of cultivation for one acre of turmeric in Coimbatore District:

	M.D.	W.D.	C.D.	B.D.	Rs.	A.	P.
Preparatory Cultivation:							
Ploughing 6 times	8		4	8	24	0	0
Manures and Manuring:							
Carting Farmyard manure and Silt from the yard. ...	6			4	14	0	0
Spreading manure. ...	4				4	0	0
Covering manure. ...	1½			1½	4	0	0
Cost of 50 cartloads of farmyard manure at Rs. 4 per cartload. ...					200	0	0
Cost of 100 cartloads of silt at 0—8—0 a cartload. ...					50	0	0
Seeds and Sowing:							
Forming ridges and furrows with country plough and reforming with mammoties. ...	5		1¾	1	7	0	0
Cost of 20 Sadus of seed rhizomes at Rs. 15/- per Sadu					300	0	0
Sowing and reforming ridges	8	4			10	0	0
Dibbling onions—8 bags at Rs. 6/- per bag. ...		16			56	0	0
Irrigation:							
40 irrigations at Rs. 12/- per irrigation. ...					480	0	0
After Cultivation:							
Weeding by means of hand hoe. ...	20				10	0	0
Mammoty weeding and earthing up. ...	24				24	0	0
Harvesting onions. ...		40			20	0	0
Cutting turmeric stalks. ...		4			2	0	0
Harvesting rhizomes. ...	20	60			50	0	0
Curing turmeric. ...	8	3			9	8	0
Watch for 10 days. L. S.	10				5	0	0
Hire on boiling pan at 0—8—0 for three days. ...					1	8	0
Polishing. ...	10				10	0	0
Hire charges at Re. 1/- for 2 days. ...					2	0	0

Marketing:	M.D.	W.D.	C.D.	B.D.	Rs.	A.	P.
Transporting to market at 0—8—0 per bag for 40 bags.					20	0	0
Kalas at 0—2—0 per bag.					5	0	0
Lease 5 pothies of turmeric at Rs. 140 per pothy. ...					700	0	0
Fuel ...					40	0	0
					2,048	0	0

Receipts:

	Rs.	A.	P.
Cost of 20 sattais of turmeric at Rs. 140/- per pothy. ...	2,800	0	0
Cost of 20 bags of onions at Rs. 6/- per bag.	120	0	0
	2,920	0	0
Net profit per acre.	872	0	0

The hire for 1 pair of bullocks is charged at Rs. 3 per day.

The hire for 1 man per day is charged at Rs. 1/-.
Do. 1 woman or boy Do. Re. 0—8—0

On an exhaustive survey of the crop, the following points are suggested for investigation:

Cultural:

(a) Whether it is necessary to leave a portion of the crop in the field itself a month or two more after the harvest of the main crop for purposes of seed.

(b) Whether there is any difference in yield or quality of turmeric grown from these 2 kinds of seed material viz., rounds and fingers.

(c) Investigations into the proper method of preserving round seed rhizomes so that the cheaper stuff can be used as seed material.

(d) The optimum spacing between the seed material sown in the field to get the maximum yield.

(e) The relative bad effects of growing various crops as a mixture with turmeric and finding out the most suitable crop that could be grown with the least harmful effects.

(f) How for the method of sowing could be done with minimum expenses and whether dibbling behind the plough as is done in Guntur could not be followed profitably in Coimbatore District also.

(g) The quality of water that is suitable and the frequency of irrigation at different stages of the crop and the optimum quantity of water necessary to give the maximum yield may be investigated.

(h) The possibility of economising on harvest charges by using bullock power for digging out the produce instead of doing it by manual labour.

Varietal:

To examine the possibility of producing a stuff suitable to the foreign market by proper selection from the produce collected from various places.

Manurial:

1. Relative value of different green manure crops that could be usefully advocated for turmeric, to increase yields.

2. Suggestion of a suitable rotation so that the fertility of the soil may be maintained.

3. Giving better facilities for ryots to get silt and compost from Municipality for their turmeric crop so that better yields could be obtained at a lesser cost.

4. Since manuring is likely to influence quality it will be interesting to find out suitable manures to improve the quality of crop.

General:

1. The Co-operative Sales Societies should be made more easily accessible to the ryots to sell the produce, by relaxing the formalities in the issue of crop advance loans.

2. These Co-operative Sales Societies establish contact with foreign merchants, to cut down the number of middlemen.

3. Many ryots have not got adequate facilities for preserving cured turmeric and as such have to hurriedly sell the produce to avoid loss through insect pests. Provision of proper storage facilities should be seriously considered in the Society godowns.

4. Every village Co-operative Society should have a power-driven turmeric polisher and the entire produce of the village should be polished in a common place.

5. The possibilities of other methods of curing the stuff, like deyhdration also need investigation.

THE THIRTY-SECOND COLLEGE DAY AND CONFERENCE

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The thirty-second College Day and Conference organised by the Madras Agricultural Students' Union was held this year from 30th July to 2nd August 1949 under the distinguished presidency of the Hon'ble Sri P. S. Kumaraswami Raja, M.L.A., Premier, Government of Madras. The Hon'ble Minister for Agriculture Sri A. B. Shetty, M.L.A. was also kind enough to be present and open the Agricultural Exhibition arranged in connection with the College Day and Conference. Sri R. M. Sundaram, M.A., I.C.S., Director of Agriculture, Madras, the regional Deputy Directors of Agriculture, and nearly all the District Agricultural Officers of the Department were present and participated in the Conference proceedings.

The Conference commenced at 10-30 A.M. on Saturday the 30th July 1949 with a welcome speech by the Principal Sri M. C. Cherian. The Secretary of the Union then moved the following resolution "The Madras Agricultural Students" Union Coimbatore places on record its profound and deep sense of sorrow at the tragic end of Sri V. C. Vellingiri Gounder-keen Agriculturist in Coimbatore District and an old patron of the Union. The resolution was passed, all those present standing in silence for two minutes.

The Secretary, Sri K. Meenakshisundaram, then read out the messages received by the Union, from many of its well-wishers, followed by the reading of the Annual Report of the Managing Committee for the year 1948-49. Prizes were then distributed by the President, to the various prize-winners of the Agricultural College during the academic year ending June 1948.

The President then delivered his address, where he made an eloquent appeal to all to bend their energies towards solving the present food crisis. The Hon'ble Minister for Agriculture followed this speech by the Premier, by another thought-provoking address before declaring open the Agricultural Exhibition at 12 noon.

The Second Session commenced at 2 P. M. with Sri T. S. Avinashilingam Chettiar, M.A., M.L. M.L.A. in the chair in the unavoidable absence of the Premier and the Director of Agriculture Sri. R. M. Sundaram, opened the discussion and a number of very interesting papers were then read as part of a Symposium on "Transmission of Research-How best to translate the results of Research into General practice". After eight papers had been read, the subject was thrown open for discussion and the view points of the general public were expressed by Sri V. C. Palaniswami Gounder, Sri V. C. Subbiah Gounder, Sri P. S. Balarama Raju and Sri C. L. Soundararajan. Sri Avinashilingam Chettiar then wound up the first day's proceedings with a short but eloquent speech.

On the night of 30th July, the Union arranged for a Variety Entertainment. On Monday the 1st August the Conference was resumed at 8 A.M. and a number of papers were read. Owing to the large number of papers that had to be presented within a limited time, all speakers were requested to give a condensed talk on salient points without reading their papers in full. This had the effect of not only saving time but also of keeping the disscussion to the essential points. The public session of the Conference came to an end at 12 noon on Monday the 1st August, with the President's concluding remarks; the subsequent two sittings - one between 2-4 P.M. on Monday the 1st August and another between 10 A.M. to 1 P.M. on the 2nd August, being in the nature of a Departmental Officers' Conference, for discussion of specific issues and difficulties encountered in the implementation of the Grow-More-Food Campaign in daily practice. On the evening of the 2nd, the Union conducted the Annual College Sports and Tea. The Championship Cup for the best athelete was secured by Sri V. N. Lakshmanan of class II. The Hon'ble Minister for Agriculture, A. B. Shetty was present during all the sessions and evinced keen interest in the proceedings of the Conference.

Principal's Welcome Speech.

The Hon'ble Premier, the Hon'ble Minister for Agriculture, Director of Agriculture.

Ladies and Gentlemen,

As Principal and President of the Madras Agricultural Students' Union it is my proud privilege to extend to you all a cordial welcome to this - the thirty-second College Day and Conference. Our grateful thanks are due to the Hon'ble Premier - Sri Kumaraswami Raja - for graciously accepting our invitation to preside over this function. The very fact that he found time to come to us amidst his many pressing engagements, shows how deeply interested he is in matters pertaining to the welfare of the ryot. We are also thankful to Sri. A. B. Shetty, our Minister for Agriculture for consenting to declare the Exhibition open. As an agriculturist himself, he can speak with authority on matters agricultural and there is no doubt that with him at the helm of affairs the destiny of the Department is in safe hands. We also express our thanks to Sri. R. M. Sundaram, Director of Agriculture, for his great interest in the affairs of the Union. Prior to his appointment as Director he has been connected with the Agricultural Department as Additional Secretary and therefore has a good knowledge of the problems confronting us.

The food problem is the most important problem of the day. The Prime Minister of India in his message to the Nation has appealed for co-operation in the drive for food production which is "ultimately a war

against poverty and ignorance, against malnutrition and high prices". The Director of Agriculture has at the recent press interview at Madras indicated the several measures which are being taken up for increasing food production. We can assure the Premier and the Minister for Agriculture that the officers of the Department will do their best to tackle the food problem.

The subject of last year's symposium was " The food crisis and its solution ", when the different Research Officers gave an account of the work done by them with a view to increasing food production by different methods such as breeding for high yielding strains, proper manuring, application of cheap and efficient ways of combating pests and diseases, etc. It is not enough if better strains are produced and better methods of control of pests and diseases are devised but the information obtained has to be taken to the very doors of the agriculturist. This year's symposium is on " How best to translate the results of research to general farming practices". In the papers which will be read at the conference an attempt is made to review the present methods of propaganda and see how far these can be improved upon. It is hoped that as many members as possible will take part in the discussion and give us the benefit of their experience.

An Exhibition has also been arranged for this occasion in the Research Institute and the Central Farm. This gives an opportunity to the public to study the nature of the work done by the Department. Arrangements have been made to explain the exhibits to those who visit the Exhibition.

This year, the British Information Services have kindly consented to loan some of their films on agricultural topics for display here. I am sure that films of this nature will be of great help in educating the public in agricultural matters.

The results of the B. Sc. (Ag) Degree Examinations have been very satisfactory. Out of the 106 candidates including reference students who appeared for the Final Examination 104 have come out successful. I take this opportunity to congratulate them and particularly Sri A. Appa Rao, for winning three medals - Robertson medal for proficiency in Agriculture, Kees medal in Agricultural Chemistry and Raghunatha Rao Medal for the highest number of marks in practical agriculture in all the terminal and final Examinations.

In this connection, I may be permitted to say a word about our Agricultural Graduates. The B. Sc. (Ag) is a three-year course where intensive training both in theoretical and practical agriculture and allied subjects is given. The University of Madras recognises this degree as

equivalent to B.Sc. Hons. or B. A. Hons. Hence it is but fair that the Government should consider the graduates of this College to be on a par with Hons. graduates for recruitment to services and not on a par with B.A. or B.Sc. as recently announced by Government.

I would also like to make another request and that is regarding the Madras Agricultural Journal. The publication of this, is a major activity of the Union. The Journal is an important link between the Agricultural Department and the Public, While thanking the Government for the small subsidy they have given us it may be mentioned that it is not possible with this amount to effect much improvement in the get-up of the Journal. Hence I request the Minister for Agriculture to consider favourably the grant for an enhanced subsidy.

Ladies and Gentlemen, I thank you once again for your presence here. Let us hope that as a result of our deliberations it will be possible to devise ways and means of helping to solve the food problem.

Report by the Secretary.

The Hon'ble Premier, the Hon'ble Minister for Agriculture, Director of Agriculture, Ladies and Gentlemen,

The Managing Committee of the Madras Agricultural Students' Union have great pleasure in presenting their report for the year 1948-49.

It is of good augury for the Union that it has been able to secure the presence of two members of the cabinet on this occasion and we take it as a recognition by Government of the importance of our annual conference in the development of progressive agriculture in our province. A number of distinguished men have graced this conference before, but it is for the first time, the Union has been fortunate in getting the Premier of the Province to preside over its annual deliberations. Moreover, apart from his interest in our affairs in his capacity as Premier Sri. Kumaraswami Raja has all along been a well-wisher of the Madras Agricultural Department. A keen and practical agriculturist himself, he has been in close touch with our activities long before he assumed the responsibilities of office and we believe he is one of those few public men who can speak with first-hand knowledge on matters pertaining to the agriculturist and his relation with the Department.

The Hon'ble Minister for Agriculture, Sri. Shetty, though perhaps, a comparative stranger to the activities of our Department, if we may say so, is a member of an important agricultural community and we take it that in spite of his sojourn in other spheres, he is at heart an agriculturist

and could therefore be expected to take more than a mere administrative interest, in the progress of scientific agriculture in this Province. The Union is extremely grateful to both of you Sirs, for the honour done to it by your presence here to-day.

It is a regrettable fact, that the food problem which has been with us, ever since the first years of World War II has not yet been solved and in spite of great efforts, we have succeeded only to a limited extent in augmenting our own production and we are still dependent on foreign imports to provide even the absolute basic minimum requirements of the nation. True, we have been able to avert actual famine and death by starvation and this by all means is no small achievement in itself in a large country like ours and when considered in the background of the world situation, to-day. But the fact has to be faced that a large mass of our population, not excluding the well-to-do class, is in a state of chronic under-nourishment and we can ill-afford to continue our dependence on other countries for the supply of the basic necessities of mere existence. Rightly therefore have our leaders stressed the need for directing all our thoughts, energy and resources towards solving this vital problem of food to the exclusion of everything else.

The nation has been asked to expect no further food imports from foreign countries after the year 1951 and the Prime Minister of India has appealed to the nation to concentrate its attention on this problem. We, the members of the Department, are fully aware of the very great responsibility we have to shoulder in the coming years in order to fulfil the expectation of our leaders and to implement the policies and programmes set down by Government. May we take this opportunity, to assure you Sir, and through you the people of this Province, that we would do our utmost not merely as men paid to do their job but as willing and zealous workers in the great national cause and be proud of the part we are asked to play in this great task.

It is a welcome sign of the times, that the agriculturist, long neglected and taken for granted is at long last being recognised as the most important factor in our national economy and is becoming the centre of attention on the part of the Government and the people. The various legislative enactments of recent times we note with pleasure, have been sponsored with a view to improving the lot of the tiller of the soil and helping him to attain a higher standard of life and raising him to a plane where his voice would be heard with respect and his influence felt. We have no doubt, that the test of this nation's progress lies in how far it has succeeded in bettering the conditions of the agriculturist in the village, for on him depends, more than any other, the future welfare of this Country.

We will not, Sirs, burden you with a catalogue of our grievances as is customary on occasions like these. But we would refer to one or two matters pertaining to the working of the Department which merit your attention. The members of the Union feel that it should be no longer necessary, that the technical staff should be burdened with work relating to the various trading schemes, a work which was necessitated during the period of war. We are glad to note that the Government have accepted this principle and we would request, that as early as exigencies of administration would permit that the responsibility of operating the trading schemes should be transferred entirely from the Taluk Demonstrator.

Another matter in which the Union is interested in, is the welfare of the graduates of the two Agricultural Colleges of the Province. We regret to note, that at a time like the present, when the services of these men should be utilised to the fullest extent in the interest of the Province, a large number of them are not employed or employed in avocations where their special training could not be made use of. Their absorption in the Revenue and other Departments would help a little, but we have to stress, that the best way to utilise them is in the Agricultural Department itself and as long as candidates are available from among the *alumini* of the two colleges, for filling up vacancies in the various branches of the Department, they should be given preference over others, as a rule.

May we, in this connection, point out that the degree course in Agriculture in this Province is taken three years after passing the Intermediate examination in Arts and the syllabus prescribed covers a wide range of subjects like Chemistry, Zoology, Botany, Engineering, Agricultural Economics and Animal Husbandry in addition to Agriculture. The hours devoted to the study of the science subjects are not less than in the B.A. or B. SC. degree pass course and we may add, Sir, that the practical training imparted in the two agricultural institutions in our Province is more intensive and strenuous than in the Arts Colleges. For these reasons, our graduates claim that their degrees should be considered on a par with the Honours degree of the University for purposes of recruitment to public Services.

At present, the competitive examinations held by the Federal Public Service Commission for recruitment to the All India General Administrative and Audit Services are not open to the Agricultural Graduates and we crave your indulgence and make a respectful request that a representation may be made to the Central Government on this matter.

The Madras Agricultural Students' Union : The Union was founded in the year 1911 and was originally intended as an organisation to bring together in a common bond of interest the past students of Saidapet

Institution and the past and present students of the Coimbatore Agricultural College and to this list has now been added, the old and new students of the Bapatla Agricultural College. It has, through the last three decades, been able to widen its scope of usefulness and stands to-day in its 38th year of its existence claiming as an organisation which serves not merely as an Old Boys' Association but as a link between the Department and the public.

Finance: Owing to the enforced interruption of its activities during the period of war, the financial position of the Union, none too secure even in pre-war years, considerably worsened and the high cost of printing and paper would have made it impossible for the Committee to run the journal during the year, but for the timely aid of the Government with a grant of Rs. 1,800/-, which partly meets our heavy expenditure. The Union takes this opportunity to place on record its sense of gratitude to the Government and the Director of Agriculture for this great help rendered to the organisation. In this connection, we have also great pleasure in recording the appreciation of the Committee for the readiness with which the students of both the agricultural colleges consented to have their subscription enhanced, at its request.

The stability of an organisation depends on its financial security and to the extent we prove ourselves worthy of Government support the Committee is sure that the Government will help us. For this we need the active co-operation of all the members of the Department to the fullest possible extent and we appeal to such of those who have not yet enrolled themselves as members and those who have discontinued their membership during the past few years, to join the Union forthwith and strengthen the organisation.

Conference: The celebration of the Annual College Day and the Organisation of an Agricultural Conference is one of the main activities of the Union. The Thirty-First Annual College Day and Conference was celebrated last year from 27th July to 1st August. The Hon'ble Sri K. Madhava Menon, then Minister for Agriculture, presided over the Conference. A symposium on "The Present Food Crisis and its Solution" was organised for the Conference, in which many prominent workers in the field, official and non-official participated. Besides the usual items such as sports, entertainments, etc., an agricultural exhibition demonstrating the various activities of the Department was also organised for the benefit of the visitors and the public. A detailed account of the proceedings of the celebrations has already appeared in the August number of the Madras Agricultural Journal.

May we, in this connection, respectfully submit that the purpose of this Conference would be better served, if a number of subordinates along with a few representatives of the Bapatla College also are deputed to attend it. It is essential that periodical opportunities should be afforded to

the mofussil workers to contact the parent institution and we hope that the slight extra expenditure involved would not stand in the way of Government granting our request. In making this request, we may be permitted to point out that on previous occasions the deputation of quite a large number of subordinates was a regular feature and we will be reverting only to an established practice which was interrupted during the war years.

The Madras Agricultural Journal: Besides celebrating the Annual College Day and conducting the Agricultural Conference the-all-the-year activity of the Union is the publication of the Madras Agricultural Journal. We are glad to record that the Journal continued to maintain the high standard associated with it. We are proud to note that research workers in departments and institutions outside our Presidency, have come to feel, that our Journal has a place among the scientific journals of the world and are seeking its aid for the publication of the results of their research activities. It has on its exchange list a wide range of publication from many places both India and foreign. The present get-up of the journal allows considerable scope for improvement and we therefore request that the Government may be pleased to enhance the present subsidy to at least Rs. 4,000/- to make the Journal more attractive

Our New Patrons: We are glad that Sri P. Karuthiruman, B. Sc. of Nanjaipuliampatti, and K. Venkataswami Naidu, B. A., B. L. of Coimbatore have become patrons of our Union during the year.

Obituary: We recorded with deep regret the premature and tragic demise of Sri V. C. Vellingiri Gounder, M. L. C., Coimbatore, an old patron and well-wisher of our Union. He never missed a conference and was taking an active part in our deliberations. We feel his absence this year. We take this opportunity to convey our condolence to the bereaved family.

Acknowledgment: It is now our pleasant duty to record our thanks to all those who have helped the Union during the year. To the Hon'ble Sri. K. Madhava Menon, the Union owes a debt of gratitude for presiding over the last year's conference and to Mrs. Kuttimalu Amma, our thanks are due for distributing the prizes and declaring the Agricultural Exhibition open. To Sri. M. C. Cherian, who as ex-officio President has identified himself with the Union and Sri. P. V. Ramiah, who have given us his help and co-operation in our contact with the Bapatla Agricultural College, the Managing Committee offers its heartfelt thanks for guiding the the affairs of the Union during the year. To Sri. M. S. Sivaraman, I. C. S., former Director of Agriculture and to Sri. R. M. Sundaram, I. C. S., O. B. E., the present Director of Agriculture, the Committee tenders its grateful thanks for their sympathy and help rendered to the Union. To all those ladies and gentlemen who helped to make the last Conference a success and helped the Committee during the year in many ways, our thanks are herein recorded.

The Hon'ble Premier's Presidential Address

Gentlemen and friends,

I deem it a unique pleasure and privilege to be called upon to preside over this function, celebrating the 32nd College Day and Conference, under the auspices of the Madras Agricultural Students' Union. My association with this function, might be deemed significant, in more than one respect. That I was Minister for Agriculture three years ago, having had concern over the Department of Agriculture and that I now happen to be the Premier of the Province, would be taken as factors bearing significance in my association with today's function. But to me, however, those factors do not appear to be of significance in relation to today's function; because, anything done in the capacity as Minister or Premier, goes as the discharge of one's own duty; and therefore, those circumstances would not bear any special significance so far as my association with today's function is concerned. But what fiills me with immeasurable pride and pleasure and what appears to me as of special significance, is the fact that an ordinary ryot and agriculturist, that I am, should be called upon to preside over this function, celebrated by the premier Agricultural Institution of this Province. So, I take the invitation to me for this function, not only as an honour done to me personally as an agriculturist, but also an honour done to millions of agriculturists in our land. In 1926, I had the pleasure of attending the annual festival of yours; I recollect the days that I spent here happily, visiting the several farms here and attending several functions in the programme of celebration of the Annual Day and Conference. Little did I expect then that 23 years afterwards I would get the honour of occupying the presidential seat in the annual day celebrations.

I view this annual day and conference as a festival for agriculturists. The fate of the agriculturist depends upon the fate of the agriculture-industry, for the progress and development of which this institution lives and works for. Agriculture has been from the very early times the mainstay for our people in this country. Even today, it remains as the backbone of our country's prosperity. The wave of industrialisation, accelerated by modern science and scientific inventions, which has passed through certain leading countries of the world and put them in the vanguard of industrial progress, has not had much effect so far as India is concerned. In those advanced countries, the natural wealth available to them by means of agriculture, has been supplemented, to a very great extent, by fresh acquisitions of wealth, earned through other industries; and thus they are rendered not only self-sufficient but also placed in a position of abundance and prosperity. In the industrially advanced countries, even the agriculture-industry has been modernised and brought up to date by adoption of the modern scientific contrivances for the improvement of

agriculture. We have seen how a country like Japan, which had no record to boast of, about half a century ago in its agricultural industry, came to occupy the forefront in agricultural-wealth, as a result of her adopting modern and scientific methods of agriculture with tremendous effort and sustained application. Maintaining agriculture, as a successful and prosperous industry and the large-scale production of agricultural produce, were targets aimed at by those countries, in their schemes for national regeneration and economic prosperity. Those advanced countries, independent as they are, have worked their schemes on a well-planned basis, with patriotic zeal and desire, to provide food for their people, by improving their country's natural wealth, and putting them in prosperity.

But in India, the tale is different. Here the factors responsible in keeping agriculture as a plant of stunted growth are many. The indifference of the ryots to take up to modern and scientific ways of cultivation, their poor investing capacity, the vagaries and vicissitudes of the seasons, and other kindred factors, have been the main obstacles against planned cultivation and agricultural development. These factors, deplorable as they are, ought to have stirred the Government into action; and any Government functioning for the good of the people, could not afford to be indifferent to the need for taking steps for the early liquidation of such obstacles or handicaps in the improvement of our country's natural wealth. But, having been subject to foreign rule, how could we expect the foreign bureaucratic Government to throw themselves heart and soul in schemes of development of industries including Agriculture for the benefit of our people? What little they did, for the improvement of agriculture in our country, was done by them more to meet the needs of export of produce essential to their own country than to look to our benefit. The attention of the foreign rulers was bestowed more on the improvement of the commercial crops which were to feed the factories in their own country. To bring more land under the plough, for increasing the production of foodgrains like paddy and millets etc., did not form the foremost among the items in the scheme of agricultural devolopment carried out by them. Commercial crops like cotton, tobacco, etc., have engaged their attention more than foodgrains; because feeding their own mills and factories in Britain, was more important to them, than feeding our people.

Under the foreign rule, our country's rural economy was on the wane, and the general standard of living among the villagers who were mostly ryots and agriculturists, was on the decline. Want of self-sufficiency has become the normal feature in the food position in our country. So much so, seasonal failures could not be stemmed over easily, unless by the import of foodgrains from other countries. Up to the outbreak of recent world-war, our people were not really conscious of the

deplorable condition in the food production in our country, as the insufficiency was made up by imports of foodgrains from other countries. But the outbreak of the war, has made us fully conscious of the precariousness of our position in the matter of food production. The seriousness of the food situation has been accentuated tremendously, during the war years and even after, which we are experiencing very bitterly even today. The countries, on which we have been depending for the imports of foodgrains, have been cut off from us, the inevitable consequences of the world-war. The war, causing disturbance in the agricultural industry in those countries and causing also tremendous dislocation in international trade, and thus depriving us of our usual sources of import of food grains, has rendered our country's food problem, more deplorable. We were hoping that the cessation of the world-war would bring relief to us; but the events have proved otherwise. The termination of the war, has only made our food position, more acute.

The increase in population, with no corresponding increase in food supply, is another factor, that has rendered the food problem more serious. Furthermore, the partition of our country, with the consequent loss of large food-producing tracts, of Sind and the Punjab, has also brought strain to the already strained food-problem. And this is the heritage that we had to take up on our assumption of independence. An independent nation, as we are today, we can not afford to be indifferent, to the food-problem which is acute. The attainment of freedom has tremendously enhanced our responsibility to find out an escape from it. We could not afford to be blind or insensitive, to the vital need of the day; everyone of us, who has at heart, the well-being and the economic prosperity of our people, should seriously think of getting over the situation facing us. We should proceed on a planned scheme of cultivation, for production of more food, by setting before us a time-limit, within which we should endeavour to reach the target of self-sufficiency and make ourselves independent in food production. In this endeavour the Governments alone cannot find solution of the problem, in the absence of the willing co-operation of the people themselves. It is the declared policy of the Central Government that the food imports from outside countries should be stopped after 1951. To hit the target of self-sufficiency in food within the said time limit, the Provinces have been asked to step up food production. Several schemes, aiming at production of more food, have been sponsored by our Provincial Government.

The well-subsidy scheme is already at work. Under the subsidising system, a large number of wells have been brought into existence in dry tracts and districts, which are not favoured with any river and canal irrigation systems. The uncertainty of the seasonal conditions leave the ryots in those areas to the tender mercy of fate. In those areas, wells

form a very valuable supplement as a source for irrigation. That the well-subsidy scheme is a very benevolent measure from the point of view of the ryots, there can be no doubt. But the success of any scheme, however well-meant or benevolent it be, depends also on the co-operation of the ryots, for whose benefit it is intended. It is deplorable and even painful to hear of some instances of abuse made under the well-subsidy scheme. It is brought to our notice that in certain cases with the subsidies got from the Government, wells were not dug at all and that they were shown only on paper. Such complaints, if true, would only speak of the dishonesty and treachery, on the part of those, who are parties to the perpetration of such fraud on the State funds, and who for that reason should be treated as the enemies of the nation. They do great disservice to the country at a time when every individual should strain his nerve to put forth all his effort to tide over the national emergency, namely the semi-starvation of our people by reason of food insufficiency. In curbing such misdoings and dishonest methods, the responsibility lies on both officials and non-officials. The latter particularly should take a leading part in bringing the wrong-doers to book, as they should realise that their cause would suffer by the misdeeds of a few persons.

The grant of subsidies to the wells is not the only benevolent scheme sponsored by the Madras Government. The passing of an enactment recently by the Madras Legislature for the improvement of tanks, water-courses and other sources of irrigation, is also another step, towards the improvement of food production. The object of this legislation is to ensure the availability of more water for irrigation. You are also aware of the Agricultural Bill proposed by the Madras Government, which has been recently published in the papers for the purpose of eliciting public opinion thereon. The main object underlying the bill is to create an urge in the actual cultivator of the soil for intensive cultivation and for increased output of foodgrains and other agricultural produce, and also for bringing under the plough vast tracts of land that still remain fallow. Of course, some of the provisions of the Bill may look objectionable, particularly from the point of view of absentee landlordism. But when you are engaged in tackling a problem of vital importance, namely the increase of food production for feeding the people and make our country self-sufficient in that respect, rights of individuals should yield in favour of the general good to the community as a whole. I request the public to help our endeavours by offering well-informed and constructive criticism of the Agricultural Bill, for our guidance and action. You may rest assured, that our Provincial Government, are not going to leave any stone unturned, in the matter of finding a solution to the food problem.

I appeal to you—those in the Department of Agriculture, and those who are undergoing courses of studies and training, in the Agricultural Colleges and who are to take up their places in the machinery of the

Agricultural Department—to realise the great responsibility hanging on us. The responsibility, though a collective one, is to be borne by every individual; and every individual has to play his part in implementing the schemes of the Government, aiming at the well-being and prosperity of the people. Whatever be the policies propounded by the Government, the agency charged with the function of executing those policies, are yourselves, namely those in service in the Department of Agriculture and those interested in Agriculture. Therefore, you should be actuated with patriotism and a high sense of duty. There must be conjoint work done in a spirit of co-ordination for the common good of the people.

The functions of the State are executed through the several departments of the Government, each of which makes its own quota of service for the community. But the function of the Agricultural Department is, I can say, the most vital of all; because it is concerned with the production of food and more food, for the people. Not only food production but also production of other agricultural products on which depends the development of many industries, are matters to be thought of, shaped and guided by you. No doubt, the Agricultural Department in the very nature of its functions may not admit of wielding power over the people as some other departments do. But is the wielding of power, the criterion to judge the usefulness of the department? Your function, being one concerned with the production of food and supply of life and energy of the people, would your department, engaged in such benevolent function, be considered any the less important, merely for the reason that there is no wielding of power associated with it?

I earnestly appeal to those of you in service and especially those who are in touch with the ryots and cultivators in the villages, to discharge your duties in a spirit of service to the community. Your task may look arduous at times. The people, with whom you have to move day in and day out, are mostly rural folk. While you are in their midst, you must make them feel that you are one among them, so that your advices may be received by them, in a homely spirit. By your patience, kindness and perseverence, you should try to convince the ryots, of the need for the adoption of modern methods of cultivation, the use of modern implements, the use of good seeds, the application of manure, and the rearing of crops and plants in general in scientific ways. You should move among the villagers with the heart and mind of a missionary, having a great mission to fulfil.

I should, however, like to give you a word of caution, cautioning you not to proceed on the assumption that the ryot knows nothing of agriculture. You should know that there are certain good aspects found in their own method of cultivation which they have gained as a result of their traditional experience, in the course of ages. If the young

demonstrator, in his enthusiasm to take credit for his learning at the college, begins to teach the villagers the first lessons in botany, he is more likely to earn contempt than credit from the villagers; because the ryots, though unaccustomed to certain modern methods and implements of agriculture, have, as pointed out already, some good aspects to their credit, resulting from their traditional experience in agriculture. Your function should be, how best to harmonise the results of your researches in the laboratories, with the traditional ways of cultivation practised by the ryots. If anything done by the ryots of a particular area or locality appeals to you as a good method in agriculture, you should not be slow to accept it. You should study it with a critical mind backed up by your scientific knowledge and learn for yourself the causes and aspects that contribute to the superiority of that particular method. And you should try to popularise that method in other places also. Assimilation of anything and everything that is found to be good, should be the guiding principle, in your evolving a practical and useful system, which will ensure good results.

As to how exactly you are to bring about the harmonious combination of your scientific knowledge gained at the colleges with the practical and traditional methods of cultivation carried on by the ryots, you are a better authority to say than myself; because you are trained experts. An occasion like this should offer a splendid opportunity for the members of the Agricultural Department and others interested in agriculture to meet in conference and discuss matters of common interest, particularly those relating to the problem of food production, which is the vital need of the hour. All of you shall pool your knowledge and experience and co-ordinate with each other towards the common end, and I hope that this conference shall prove an eventful one in that direction.

In your annual report you have drawn the Government's attention to certain matters, which, it is stated require rectificaion. With regard to your representation that it is no longer necessary that the technical staff should be burdened with work relating to various trading schemes, I am in agreement with you. The Government will see to the transfer of responsibility of operating the trading schemes from the Taluk Agricultural Demonstrators. With regard to the employment of the graduates of the Agricultural College in other departments of the Government, there is at present no bar existing against their recruitment to those departments, as the agricultural degree is recognised as a qualification for the selection of candidates for Government service.

You have also represented that at present the competetive examinations held by the Federal Public Service Commission for recruitment to the All-India General Administrative and Audit Services, are not open to Agricultural Graduates. I am not aware of the

extistence of any such bar imposed by the Federal Public Service Commission with regard to Agricultural Graduates. If it exists, I should think that it is really a hardship to the Agricultural Graduates. It is high time that steps taken are to see to the removal of such a bar; and you can count upon the assistance and support of the Madras Government in any move in that direction. With regard to the absorption of the Agricultural Graduates in the various branches of the Agricultural Department, there can be no doubt that the Agricultural Graduates should be given preference. That principle stands to reason and fairness. You have also referred to certain other matters in the report. I may say that I shall bestow my close attention on those matters and do whatever is possible.

In conclusion I thank you for your kindness to me.

The Hon'ble A. B. Shetty, M. L. A., Minister for Agriculture's Speech

Ladies and Friends,

We are meeting at a time when Agriculture and Food Supply has become the major problem of the day. The world is passing through a troubled period of its history. According to Aldous Huxley the human race is facing a double crisis to-day—a political and economic crisis at an upper level and another crisis in population and world resources at a lower level. The immediate causes of the upper level crisis are the economic breakdown due to the last world war and the struggle for power between the two groups of nations led by America on one side and Soviet Russia on on the other. The crisis in population and world resources intensifies the crisis on the political and economic levels and leads to greater rivalry between the two power blocs for the possession of the earth's resources. A recently published book called 'Road to Survival' has attracted a great deal of notice in thinking circles. It sounds a note of alarm regarding the serious depletion of the earth's resources and the resulting danger of it to the fast growing population of the world. Food-its production and distribution — has become a matter of international concern. The Food and Agricultural Organisation started by the United Nations Organisation is engaged in finding out ways and means of developing agricultural and food resources to meet the needs of a fast-growing population.

In our country the solution of food problem has become the pre-occupation of our time. It is a thousand pities that a predominently agricultural country like ours should be faced with food shortage and that it should be put to the necessity of importing food from foreign countries at a heavy cost to the National Treasury. The growth of population at the rate of about 4 millions a year makes the question of food supply a permanent problem in this country. The partition of the country has made us lose the wheat and rice surpluses of Western Punjab and Sind.

Some of the best irrigated tracts have gone under Pakistan and made us more dependant on the vagaries of the monsoon. The civil war in the rice-exporting countries of Asia resulting in a decline in food production, shortage of fertilisers and manures like groundnut cake, inadequate supplies of essential materials like iron and steel for agricultural implements and cart tyres and a succession of bad seasons are among the factors that have added to our difficulties in regard to the food situation. The Grow More Food campaign started in 1942 under the Adviser Regime has not produced the results expected from it. In 1947 the present popular Government followed it up with a five-year plan of food production and this too has not yet brought us relief. Our food production is very much in the nature of a gamble in the monsoon. The first requisite for increasing food production is an assured supply of water. All possible irrigation sources have, therefore, to be developed to provide more water for agricultural purposes. Madras has several long-term and short-term plans of irrigation development. Since the major irrigation projects that have been taken up require a number of years for completion, Government have launched upon a five-year programme of minor irrigation works which are expected to be completed by 1952 at an estimated cost of 6 to 7 crores. Besides such new irrigation schemes, steps are being taken to restore the lost capacity of the existing irrigation tanks which are about 25,000 in number in ryotwari areas, and this will cost several crores of rupees. Since the inception of the G. M. F. campain, a sum of Rs. 5.78 crores has been given as subsidy for digging new wells and repairing old wells until March 1949.

You are well aware of the action taken by the Agricultural Department for stepping up food production by better manure, improved strains of seed, control of pests and diseases and use of tractors and other agricultural machinery, The failure of monsoon in two successive years has upset many calculations and in spite of all that has been done, the food problem continues to be a matter of anxious concern. Imports of food grains are being got by the Government of India from foreign countries. Exorbitant prices have to be paid for this purpose on account of international profiteering in the sale of foodstuffs. The cost of these imports has been going up every year since 1946. In 1948, 2.1 million tons had to be got at a cost of Rs. 130 crores. This year, imports up to 4 million tons may be required and this would cost Rs. 175 crores. These imports are a great drain on our exchange resources which are badly needed for getting our industrial requirements. The Central and Provincial Governments have to pay huge sums as subsidies for bringing down the prices of imported grains to the level of the prices in this country. The net result of last year's food imports was a loss to the exchequer of Rs. 32 crores. The money thus spent on food imports and the losses incurred cut into the funds which could be utilised for nation-building

schemes. As stated by our Prime Minister, Pundit Nehru, food has become our basic problem upon the solution of which depends the whole economic development of this country on healthy lines. Government have become aware of the gravity of the foreign exchange problem and of the disorganisation of our national economy. They have, therefore, decided to stop the imports of foodgrains from abroad after 1951.

In 1940, agriculture was put on something like a war-footing in Britain and this helped them to counteract the U-Boat campaign. Three months ago Lord Boyd Orr came here on the invitation of the Government of India to study our food problem. He has recommended that the food problem should be tackled on a war basis, as Britain did in 1940, by cutting the red-tape attached to normal departmental procedure and setting up a machinery at the Centre as well as in the Provinces to secure quick decisions and speedy implementation. He has also pointed out that the equipment, fertilisers, executive staff and finance needed for this special drive should be provided to the extent possible. The Central Government have accepted his recommendations. Our Prime Minister and Governor-General have broadcasted an appeal to the nation to make an all-out effort to obtain self-sufficiency in food by 1951 and to ease the whole economic position. A concerted drive has been started for this purpose. A Food Commissioner with considerable powers to act speedily and effectively has been newly appointed at the Centre and a Food Production Board has been formed to assist him. He will deal directly with the Commissioners of Food Production set up in the provinces for carrying out the programme of increased food production. The Central Ministry of Agriculture have promised to allot a larger quota of iron, steel, etc. for agricultural purposes and to expedite their supply. The Economic Commission for Asia and the Far East are expected to send to this country increased supplies of Agricultural Machinery, fertilisers and the material required for irrigation projects. Agriculturists who achieve high success in increasing the yield of food grains will be awarded special medals and prizes. The revised food plan to be implemented in Madras in 1949-50 and 1950-51 is estimated to cost Rs. 34½ crores. In this are included P. W. D. schemes costing Rs. 7 crores, agricultural schemes costing over Rs. 21 crores, well subsidy schemes costing Rs. 3 and odd crores and tank improvement schemes costing Rs. 3 crores. The net cost of these schemes to Government will be 16.78 crores, of which 10.50 crores will be the Provincial Government's share and the rest will be borne by the Government of India. The estimated additional production in tons from 1947-48 to 1950-51 is a little over 12 lakh tons.

Our agricultural statistics being defective, it is not possible to correctly gauge the food situation in the country. It is contended in some quarters that much of the present trouble is due more to the control machinery than to food shortage. There is no doubt that procurement is

unpopular with the ryots. The existence of rigid control is not conducive to increased food production which is the real remedy against the present unsatisfactory state of affairs. There is a proposal to have a levy scheme excluding from procurement smaller holdings. This will minimise complaints from the large class of smaller ryots regarding harassment from procurement officers. The reintroduction of statutory rationing and informal rationing on a country-wide scale necessitates larger imports which the country cannot afford at present. The Government of India seem to be veering round to the view of the Madras Government and considering restriction of rationing to areas where they are really needed. This will reduce our ration commitments.

Agriculture being our premier industry, the prosperity of the agriculturist is essential for the general prosperity of the land. There can be no incentive to increased production so long as the cultivator is not able to get economic prices for his surplus produce. He prefers the growing of more remunerative commercial crops and in many places money crops are being grown instead of food crops. The prices now fixed for food-grains in Madras seem to have given some satisfaction to the ryots. The improvement of procurement this year is due to the increase given in prices. The Madras prices are moderate compared with the prices in other provinces. If the Government of India pursue their policy of reduction of prices, it will defeat the present attempts made for increasing food production. The Food Conference which will be meeting at Delhi on the 1st and 2nd of August will, I hope, come to right decisions regarding the question of restricting rationing and fixing remunerative prices for food-grains so as to ensure a fair return to the cultivator.

Next to water, manure is the most important single factor for increasing food production. The supplies of artificial fertilisers and groundnut cake being short of our requirements, we have to make full use of the organic manures which can be made more early available to ryots everywhere. The green manure drive should be continued with greater vigour. The ryots in every village should be instructed in the proper method of preparing farm yard manure and storing and using it. The planting of quick-growing fuel trees will supply alternative fuel and help to some extent in putting an end to the prevalent practice of using cattle-dung cakes as fuel. The National Tree Planting Week inaugurated in August last in response to the appeal issued by the Hon. Sri Jairamdas Doulatram is meant to replenish fuel supplies and conserve stocks of farmyard manure for increasing soil fertility. The agricultural officers should secure the co-operation of people in every district and organise the second Tree Planting Week next month in a successful manner in as many places as possible. The development of compost making in urban and rural areas will contribute to large-scale manurial production. A Provincial Compost Development Officer has been appointed to look after efficient

production and distribution of compost to ryots.' Sixty-two municipalities and 47 panchayats have so far taken to compost making. Government expect all local bodies to take up compost manufacture and help food production. In the villages ryots can convert vegetable wastes and farm wastes into useful manure and a subsidy of Rs. 1 per ton will be given to the manucturer of village compost.

The question of subsidiary food production has been taken up in right earnest by the committee appointed by the Central Government for this purpose last month. Three Development officers will investigate factors affecting large-scale production of sweet potato, tapioca and banana which are believed to give larger units of calories per unit area. One of these officers will deal with the scheme of work in South India. You must have read of the experiments that are being made at Delhi and in Madras as regards the keeping quality and palatability of mixtures of sweet potato and tapioca with groundnut flour and the processing of groundnut flour. The Prime Minister and the Governor-General have appealed to the people to reduce the consumption of the basic cereals of rice and wheat and substitute them with supplementary foods to the extent possible. The well-to-do classes may well set an example in this matter.

The money spent for Agriculture bears the proportion of As. 12 to Rs. 100/- in the budget of the Central Government. Provincial Governments also have been niggardly in their expenditure on Agriculture, though it is a provincial subject. The allotment of Rs. 1·36 crores for Agriculture in the Madras budget forms only 2·4 per cent of the total expenditure. Now that food production has been given top priority, Government will have to spend more money and employ more men for the development and improvement of agriculture. With a view to make agricultural education sufficiently attractive, Government have passed an order last month recognising the B. Sc. degree in Agriculture as equivalent to the B. A. or B. Sc. University degree in this Province for purposes of appointments in any department of Government.

Governmental effort by itself is not enough for the success of the food drive. The enthusiastic co-operation of the people must be enlisted and it must become a nation-wide campaign. More than anything else, it is important to contact the farmer, convince him, and make him join whole-heartedly in working the food plan. Scientific knowledge and advice must reach the man behind the plough. The Government of India propose to organise an extension service to carry the results of research to the fields and to enlist the active support of farmers in the activities of Government in the matter of increased food production. The F. A. O. has been requested to lend the services of an expert in extension service

to advise Government in carrying out their intention. It is no easy job to approach the ordinary cultivator and make him adopt modern scientific methods of agriculture. The majority of agriculturists in this country cultivate tiny plots of land. Their resources are small. Being illiterate and poor they have neither the desire nor the means to adopt present-day farming practices. The exhibition which has been organised here is one method of arousing the interest of people in the activities of the Agricultural Department. Leaflets, articles in newspapers, films, broadcast talks and exhibitions are all good in their own way to educate the farmer. But there is nothing to beat the demonstration on the farm. In a country where illiteracy is widespread, as it is in India, effective propaganda must be based mainly on ocular demonstration. The gospel of good husbandry can be most easily taught by taking the ryot to see with his own eyes the results of new methods on the plot of any farmer who does his job particularly well.

Any long-term food policy must go along with a planned population policy. The rapid growth of population is creating a serious food problem all over the world. The population in the Indian Dominion is increasing at the rate of 4 millions a year and in our province we are adding to our population a little over half a million per year. The problem of balancing population and food supply must be a matter of deep concern to the Government and the people in our country. Steps will have to be taken to control the rate of population growth by adopting the practice of family limitation. Attention has been drawn to this matter by the Famine Enquiry Commission but so far little or nothing has been done in this direction.

The personal example set by Rajaji in helping to plough the estate of his residence and by Pundit Nehru in raising food crops and vegetables in his compound are meant to show their earnestness in solving the food problem. Both of them have made a special appeal to congressmen to lead a movement for food-growing. Nehru has rightly said that this co-operation in a mighty drive for food production is ultimately a war against poverty and ignorance, against mal-nutrition and high prices. Congressmen have responded to such calls from national leaders at many a time of national emergency. The tremendous determination and the great spirit of service and sacrifice displayed by congressmen in winning the Battle for Independence must now be shown in fighting the Battle for Food and making this country independent of foreign imports. By taking up this campaign, the Congress organisation can establish mass contact, revitalise itself and keep up its hold on the minds of millions of people in this country. The new slogan "Produce or Perish" must take the place of the old call to "Do or Die". There will then be a new spirit abroad in the countryside and the attempt to increase food production is bound to achieve much greater success than it has done in the past.

Opening of the Discussion by Sri R. M. Sundaram, I. C. S., the Director of Agriculture

I have great pleasure in welcoming the Honourable Minister for Agriculture and all of you to this Conference. It has been the practice at these conferences to consider one of the vital problems affecting our country on the agricultural side. The subject chosen for to-day's discussion is "How best to translate the results of Research into General Farming Practices" A number of officers of the Department have submitted papers on this subject and ten of them will be read to-day. There will be a general discussion which will follow this. Non-officials are requested to offer their opinions and then those officials who had not read papers will be invited to offer their views. As the time at our disposal is short, no speaker will be allowed more than 10 minutes.

Coming to the subject of the Symposium, I wish to offer my own views in a brief manner. There has been a long-standing complaint that in India, Agricultural Research has advanced very far, but the cultivators have not kept pace with Research and that adequate arrangements do not exist to translate into practice all the theory that we preach. This criticism seems to be justified to a large extent. The entire aim of the Department should be to enlighten the ryot by propaganda in suitable forms. At present, the Department carries on its propaganda by (1) printed literature, (2) demonstration on the field and (3) by contact with ryots in the shape of talks, lectures, radio programmes, etc. The high percentage of illiteracy in India is a severe handicap to the first form of propaganda. Demonstration in ryots' lands and in our Research Stations have been carried on vigorously. The radio is an effective means of dissemination of knowledge, but the number of villages owning radio sets is very limited. Our staff maintains close contact with the ryot, but its strength is not adequate for the purpose. One demonstrator with a few fieldmen and maistries is in charge of taluk with over 100 villages and is hardly able to visit more than one village per day. He is saddled with depots under "State Trading Schemes" (selling seeds, manures, etc. and accounts). The expenditure under the Agricultural Budget of our Province is about 1·30 crores which is only 2·4 per cent. of the total revenues of the Province. Unless this field staff is doubled at least, we cannot possibly cater to all the villages in the Province in a satisfactory manner.

The Madras ryot is no doubt conservative, but I claim that he is a shrewd individual and would not turn down any proposal to increase his yield per acre. It has been stated that apart from his illiteracy, the poverty of the ryot and the system of land tenure resulting in uneconomic holdings are responsible for his apathy. The Zamindari system and Absentee landlordism are also said to be responsible for the moribund condition of agriculture. While these may be true and account for the

fact that a tenant does not wish to make permanent improvements to the lands he cultivates, no ryot would be unwilling to get a betttr return for his toils. It is therefore clear that Departmental propaganda is sure to succeed if organised on proper lines. Ryots have to be tackled in person through meetings, lectures, radio talks, posters, exhibitions and dramas. Good advertisement of the work done in Research Stations is bound to attract notice.

The human element is very important in propaganda. The staff would do well to study the state of mind of the ryot he has to tackle and shape his publicity methods accordingly. To provide adequate training in propaganda methods, the final year Agricultural Students are now given a course of lectures on the theory and methods of propaganda. This would enable the students to develop their propaganda work on a rational basis.

At present, the Department has the following methods: (1) News letter every month. (2) Departmental Journals, Mezhichelvam, etc., in regional languages. (3) Administration report of the Department by Director of Agriculture. (4) Leaflets. (5) Pictorial Posters. (6) Monographs on certain crops. (7) Popular accounts of work done in the several Agricultural Research Stations. (8) Running Demonstration Plots in Ryots lands. (9) Exhibitions. (10) Press talks by Departmental Officers on particular matters of topical interest like outbreak of pests and diseases, cultivation of certain crops, extension of irrigation facilities, etc. (11) Radio talks by our officers.

There is now a proposal to purchase eight propaganda vans fitted with full equipment of library, specimens of improved seeds, sound films projectors, loud speaker equipment etc. It is also proposed to take documentary sound films of Department activities to be shown at various gatherings, exhibitions, etc.

Extension Service: In the United States of America there are country agents of the Agricultural Department who do valuable propaganda. There are enlightened ryots who have adopted improved methods advocated by the Department and they in turn tour the villages and induce ryots to follow them. The Government of India are inviting certain experts from U. S. A. to advise us in devising a similar plan for India.

Prize Schemes: The periodical holding of exhibitions and awarding prizes for the best cultivator or the ryots who have adopted improved methods of cultivation are also under contemplation. This would help to give publicity to the activities of the Department.

It is notorious that in India yields have always been poor. Climatic and soil conditions no doubt play a very important part, but the endeavour of the scientist is to find out the causes of poor yields and the

remedies. In view of the alarming increase in population and our dependency on foreign countries for imports of food grains, the situation is worsening every year and unless we make the country self-sufficient in Food, there is no hope for the prosperity of our country. The aim of all research is to increase crop yields and the problem of translating the results of Research to the Farming practices of ryots merits serious consideration. Gentlemen, your views are invited on this problem.

LIST OF PAPERS RECEIVED FOR SYMPOSIUM ON

"Transmission of Research - How best to translate the results of Research into General Farming Practices".

1. How best to translate the results of Research into General Farming Practices — M. Kantiraj.
2. How best to translate the results of Research for the benefit of the average farmer — B. M. Lakhmipathy.
3. How facts flow to farmers in U. S. A. — S. Krishnamurthy.
4. Research and Propaganda-A plea for Re-orientation — K. C. Naik.
5. Some lessons of the Bagavadi Demonstration Farm — S. Kasinathan.
6. Transmission of Research-How best to translate the results of Research to General Farming Practices — V. Manikya Rao.
7. How best to translate the results of Research to General Farming Practices — M. Subramaniam.
8. Transmission of Research-How best to translate the results of Research into General Farming practices — Md. Khasim Adeni.
9. How best to translate the Results of Research to General Farming Practices with particular reference to sugarcane. — S. V. Parthasarathi & J. V. V. Suryanarayana.
10. Transmission of Research-How best to translate the results of research into General Farming Practices — S. A. Ebrahim Ali.
11. How best to translate the results of Research to General Farming Practices — M. R. Balakrishnan.
12. The Indian Ryot and Agricultural Research — T. B. Dasarathy.
13. Pedigree seed of Rice — Its rapid extension in the country — M. B. V. Narasinga Rao
14. How best to translate the results of Research into General Farming Practices — M. Lakshmikantham.
15. Transmission of Research-How best to Translate the Results of Research to General Farming Practices — C. Balasubramanian. & M. B. V. Narasinga Rao,

16. How to translate the findings of Research and improved methods of Agriculture to the Ryots — T. K. Balaji Rao.
17. How best to translate Research into General Farming Practices — P. L. Marasimham.
18. Transmission of Research on pest control — S. Ramachandran.
19. Transmission of Research-How best to translate the results of Research into General Farming Practices — A. Kunhikoran Nambiar.
20. Means to enforce Research-Finds — K. Sankaraiah.
21. How best to translate the results of Research into Farming Practices — M. P. Sankaran Nambiar.
22. Results of research their application to General Farming practices with special reference to sugarcane — C. Ekambaram.
23. Publicity in Production — G. Satyanarayana.

PAPERS OF GENERAL NATURE.

1. Crop planning under the Tungabhadra Project — S. Kasinathan.
2. Some useful plants for green manure purposes for the saline tracts of the Presidency — S. N. Chandrasekharan & C. Rajasekhra Mudaliar.
3. How the chemistry section helps the farmer — P. D. Karunakar.
4. Increasing fruit production through better facilities for reproduction — J. Subramaniam.
5. Possibilities of growing more food on the Deltas of the Northern Circars — C. V. Sarvayya Chetty.
6. Rice Culture in countries with high yields–its lessons for Madras — M. B. V. Narasinga Rao.
7. Fodder problem in Madras — S. N. Chandrasekharan & Daniel Sundaraj.
8. Some aspects of the Fodder problem on the Madras Presidency — T. Venkataramana Reddi.
9. The interactions of the productive Factors in Rice — M. Satyanarayana.
10. Utilization of fruits and vegetables — Dr. G. S. Siddappa.
11. A short resume of plant protection, its present, past and future. — V. Tirumala Rao.
12. The Imminent urgency for propaganda in the grow more food campaign — C. S. Seshagiri Iyer.
13. Water Hyacinth-A Problem — do.

PAPERS OF TECHNICAL NATURE.

1. Deficiences of minor elements responsible for diseases of crop plants in S. India — D. Marudarajan.
2. Varieties and Forms of coconuts — G. V. Narayana.
3. The Phosphoric Acid content of some raw and parboiled rice samples — M. R. Balakrishnan & D. Narayana Rao.
4. Embryo culture and its use in plant breeding — P. Uttaman.
5. Stem Borers of sugarcane in Madras Presidency and their control — C. Krishnamurthy.
6. Field Trials of Gammexane against Paddy grasshoppers — N. Sobanadri.
7. The ocurrance of *Stomaxys calcitrus* L. as a serious pest of cattle in the river side villages of Cuddapah District during musk melon season — C. S. Balasubramaniam.
8. Commerical plant-hormone products-a brief survey — L. Venkata Ratnam.
9. A study of the composition of well waters in and around Bapatla — M. R. Balakrishnan & D. Narayana Rao.
10. Natural crossing in cumbu, *Pennisetum typhoides*, Stapf and Hubbard — P. Krishna Rao.

Report of the Managing Committee for the year 1948 — '49.

(Presented to the General Body)

The Managing Committee presents the following report of the activities of the Union for the year 1948 — '49.

Membership : The strength of the Union as it stood on 31st July was 961 as against 731 of last year and 510 year before last. It is gratifying to note that this is the highest membership on record ever since the inception of the Union, still a large percentage are outside the Union despite our appeals sent to many officers. The increase in membership is partly due to the joining of the students of the Agricultural College, Bapatla, as members of the Union and in this connection the Union thanks Rao Bahadur Sri P. V. Ramiah, Principal. Messrs. M. R. Balakrishnan and T. Nataraj for the interest evinced by them in the welfare of the Union. The members on roll would have been much more but for the painful duty which the Managing Committee was forced to take effect discontinuance of the membership who were in arrears of subscription for over three years. We take this opportunity to appeal to all the officers who were not members already to enlist themselves as members and help the Union in enlisting members in the future. We would also request the students who pass out of the colleges to continue their membership.

Officer bearers: During the year the Manager Sri T. V. Subramaniam and the Treasurer Sri G. Rangaswami resigned their posts consequent on their transfer outside. Sri S. Muthuswami was co-opted as Manager in the place of Sri T. V. Subramaniam.

General Body Meeting: There was a General Body Meeting of the Student Members of the Union on 20—1—'49 to consider about the Government Order for requesting the student members to increase their subscription from Rs. 2/- to Rs. 3/- and this was readily accepted by them for which we are thankful to them.

Meeting of the Managing Committee: 15 meetings of the Committee were held during the year.

The Madras Agricultural Journal: The Journal continued to be published with unfailing regularity and promptness.

Editorial Board: 10 meetings of the Editorial Board were held during the year. A good number of articles on various subjects were received for publication in the journal and we have great pleasure to record our thanks to the various authors who have contributed to the success of the journal. We appeal once again to the officers of the Department to evince greater interest in the journal by sending more popular articles to help the countries' progress of scientific agriculture. The monthly publication of "*Hints to Farmers and Agricultural News Letter*" in the journal are the new features introduced during the year and we are glad that the contributions are appreciated by our readers.

We have great pleasure in recording our thanks to Mr. C. S. Krishnaswami, Editor and to other members of the Editorial Board for the able and efficient conduct of the journal during the year. We record our appreciation of the promptness of our printers, The Coimbatore Co-operative Printing Works, Ltd., Coimbatore - and with their co-operation and interest the publication of our journal has been made easy.

Subscribers: The number of non-member subscribers to the Journal during the year was 200. Discontinuation of the despatch of journal for non-payment of subscription for over three years was done from the beginning of this year and this has accounted for reduction of subscribers to the journal. Due to high cost of printing and paper the managing committee has resolved to increase the subscription of the journal from Rs. 4/- to 6 and this needs now your approval. We wish to invite the attention of the moffusil members that they would be rendering a great service to the Union if they would help in enlisting more subscribers.

Finance: The Managing Committee records its gratitute to the Government for the ready help in granting us the increased subsidy for the journal Rs. 1,800/- from Rs. 400/- with this year 1948-'49 on wards. The auditors' report and financial statement are before you. Our finances have improved due to continuous collection of all arrears due from 1945 onwards. The committee has canvassed a number of advertisements during the year and increased its finances during the year. A sum of Rs. 500/- was added to the fixed deposit as Reserve Fund for the Union. A sum of Rs. 400/- was spent for building and furniture repairs to the Union, as these were not done for many years.

Ramasastrulu Munagala Prize: We have to record with regret that the response for the Ramasastrulu prize was meagre this year also. Only two essays were contributed. We regret to report that the committee of judges, who at our request scrutinized these two essays declared that neither of them merited the award of the prize.

Acknowledgment: Now it is our pleasant duty to convey our thanks to the various members of the Union who have helped in different ways during the period under review. We are specially thankful to Mr. M. C. Cherian, our ex-officio president for his keen and sustained interest and sympathetic attitude in all union activities and to Mr. P. V. Ramiah, Principal, Agricultural College, Bapatla for his help to our Union in all activities concerning that College. To Mrs. R. N. K. Sundaram, our thanks are due for distributing the sports prizes last year. We have pleasure in recording our grateful thanks to the convenors and members of the various committees who whole-heartedly helped in celebrating the College Day and Conference last year.

General Body Meeting.

Proceedings of the General Body Meeting of the Madras Agricultural Students Union. The business meeting was held on the 31st July 1949 at the Research Institute with Sri M. C. Cherian, ex-officio President in the chair. The report of the Managing Committee for the period 1948-'49 was presented and approved. The auditors' report was then discussed and was passed with a minor ammendment. The resolution tabled by Sri C. Balasubramania Mudaliar was considered and passed with an ammendment. In accordance with the above the revised rates of subscription become (i) all student members Rs. 3/- each (ii) officers with salary of Rs. 100 - 250/- Rs. 4/- and (iii) those with salaries of Rs. 250 and above Rs. 6/- a month. Two resolutions given notice of by the student members were unanimously passed and recommended for immediate communication to the proper authorities. The election of the Office bearers for 1949 - '50 was then gone through. The list of elected numbers is appended in the cover page. With a vote of thanks to the retiring committee proposed by Sri V. T. Subbiah Mudaliar and with a short address by the newly elected vice-President Sri P. Krishna Rao the meeting terminated.

List of prize winners in 1948.

Name of Winner.	Name of Medal.	Description of Prize.
A. Appa Rao	Robertson Medal	For Agriculture
S. Muthuswami	Glogstoun Medal	For General proficiency.
A. Appa Rao	Kees Medal	For Agricultural Chemistry.
A.Appa Rao	Raghunatha Rao Medal	For practical Agriculture.
G. Rajagopalan	D'Silva Memorial Medal	For Animal Hygiene.
H. Poornapragnachar	Goshen Medal	For Agri. Zoology.
V. Muthiah	Anstead Medal	For Plot cultivation.
A. Venkataraman	K. S. Venkatarama Ayyar Medal	For Highest number of marks in the First examination.
D. Meenakshi-sundaram	Sampson Memorial Medal	For Agri. Botany.
D. Meenakshi-sundaram	Dev. Bah. L. D. Swamikannu Pillai Medal	Highest in all the three examinations.

College-Day Sports, 1949

LIST OF PRIZE WINNERS.

Champion of the year 1944—V. N. LAKSHMANAN.

Cross Country Race: (5 Miles)
(The Norris Cup)
1. Kalliappan, R.
2. Krishna Alwa, H.
3. William Paul.

Pole Vault:
1. Shanmugam, C T.
2. Ratnaswami, M. C.
3. Yeshvant Ail.

100 Metres Dash:
(The Saidapet Old Boys Cup)
1. Lakshmanan, V N.
2. Raman, S
3. Balakrishnan, V.
(New Record)

Shot Put: (16 lb.)
1. Krishna Alwa, H.
2. Lakshmanan, V. N.
3. Appiah, K. M.

200 Metres Hurdles:
1. Lakshmanan, V. N.
2. Balasubramaniam, V.
3. Francis, S. P.

Long Jump:
1. Balakrishna Alwa, K. N.
2. Ramiah, S. M.
3. Lakshmanan, V. N.

Cricket Ball Throw:
1. Ranganathan, P.
2. Duraiswami, R.
3. Balakrishna Alwa, K. N.

110 Metres Hurdles:
(The Ramaswami Sivan Cup)
1. Lakshmananan, V. N.
2. Francis, S. P.
3. Ranganathan, P.
(New Record) Time 19 2/5.

High Jump:
(The Tadulingam Cup) 4' 10"
1. Ranganathan, P.
2. Lakshmanan, V. N.
3. Paramanandam, P.

Invitation Race: (800 Metres):

1. Chinnaswami, S.
Municipal High School,
R. S. Puram.
2. Natarajan, K. A.
St Micheels' High School.
3. Sankaran, C.
Govt. Arts College.

Hop Step and Jump:
(37'. 2½ New Record)

1. Paramanandan, P.
2. Ranganathan, P.
3. Lakshmanan, V. N.

400 Metres Race:

1. Kolandaswami, S.
2. Shanmugam, C. T.
3. Rajagopalan, T. V.

Javelin Throw:

1. Appaiah, K. M.
2. Yeswant Ail.
3. Ramamurthi, K. V.

1,500 Metres Race:
(The Anstead Cup)

1. Kaliappan, R.
2. Ayyaswami.
3. Mahalingam.

Old Boys Race: (Handicap)

1. Jayaraj.
2. Varadarajan, S.

4 x 400 Metres Relay Race
The Chunnampet Shield.
(Intertutorial)

1. P. D. Karunakar's Wards
2. V. T Subbiah Mudaliar's Wards

Tug of War: The Ramnad Shield.
(Inetertutorial)

1. R. Balasubramaniam's Wards.
2. V. T. Subbiah Mudaliar's Wards.

Obstacle Race:

1. Balasubramaniam, V.
2. Yeswant Ail.

Crop and Trade Reports

Cotton Raw, in the Madras Presidency: The receipts of loose cotton at presses and spinning mills in the Madras Presidency from 1st February, 1949 to 29th July, 1949 amounted to 250,047 bales of 392 lb. lint as against an estimate of bales of the total crop of 1949. The receipts in the corresponding period of the previous year were 287,475 bales. 333,531 bales mainly of pressed cotton were received at spinning mills and 2,835 bales were exported by sea while 65,324 bales were imported by sea mainly from Karachi and Bombay. (From Director of Agriculture, Madras)

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Weather Review — For July 1949

RAINFALL DATA.

Division	Station	Actual for month in inches	Departure from normal in inches	Total since January 1st in inches
Orissa & Circars.	Gopalpore	3·3	−3·9	6·0
	Calingapatam	3·0	−2·5	7·5
	Vizagapatam	2·5	−1·9	12·2
	Anakapalle*	3·8	−1·2	12·4
	Samalkot*	14·3	+8·2	20·0
	Kakinada	15·2	+8·6	25·3
	Maruteru*	11·3	+4·1	20·0
	Masulipatam	15·5	+9·1	21·8
	Guntur*	9·7	+3·7	19·8
	Agrl. College, Bapatla	12·3	+7·6	18·3
	Veeravanam (College Farm)	10·7	(x)	16·0
Ceded Dists.	Kurnool	4·8	+0·4	13·3
	Nandyal*	6·0	+0·9	14·8
	Hagari*	0·6	−0·7	5·2
	Siruguppa*	1·9	−1·1§	7·5
	Bellary	0·4	−1·2	4·4
	Rentichintala	5·0	+0·2	16·1
	Cuddapah	6·7	+2·6	13·7
	Anantharajpet*	9·9	+5·7	18·3
Carnatic.	Nellore	5·2	+2·4	16·2
	Buchireddipalem*	6·9	+4·9	14·4
	Madras	2·9	+0·7	15·8
	Tirurkuppam*	6·9	+1·9$	20·9
	Palur*	5·2	+2·0	16·0
	Tindivanam*	3·7	+1·0	9·8
	Cuddalore	7·7	+5·1	16·2
Central.	Vellore	8·4	+3·8	20·5
	Gudiyatham*	6·4	+3·7	17·1
	Salem	2·7	−1·1	16·0
	Coimbatore (A. C. R. I.)*	3·0	+1·5	7·4
	Coimbatore (C. B. S.)*	3·5	+1·8	7·6
	Coimbatore	3·0	+1·3	8·3
	Tiruchirapalli	4·5	+3·4	11·4

Division	Station	Actual for month in inches	Departure from normal in inches	Total since January 1st in inches
South.	Negapatam	3·0	+1·3	8·2
	Aduturai*	2·4	+0·8	8·5
	Pattukottai*	5·8	+2·9	9·3
	Mathurai	4·6	+2·6	17·3
	Pamban	Nil	−0·5	8·7
	Koilpatti*	2·0	+1·5	10·0
	Palamcottah	1·6	+1·3	11·5
	Ambasamudram*	0·7	Nil	6·6
West Coast.	Trivandrum	11·1	+3·3	37·4
	Cochin	29·1	+5·8	78.9
	Calicut	39·8	+5·5	97·5
	Pattambi	27·1	+1·4	68·7
	Taliparamba*	50·4	+1·6	102·5
	Nileshwar*	45·3	+4·2	116·7
	Pilicode*	50·6	+8·0$	109·6
	Mangalore	50·7	+11·3	118·8
	Kankanady*	51·5	+12·8	118·0
Mysore & Coorg.	Chitaldrug	1·0	−1·9	6·3
	Bangalore	13·8	+9·9	21·2
	Mysore	4·5	+1·8	13·7
	Mercara	37·8	−5·3	69·7
Hills.	Kodaikanal	8·4	+3·7	21·6
	Coonoor*	6·0	+3·6	16·9
	Ootacamund*	6·5	+0·6	23·3
	Nanjanad*	9·0	−0·2	20·4

Note:— (1) * Meteorological Stations of the Madras Agricultural Department.

(2) Average of ten years data is taken as the normal

(3) x Readings are being recorded only from February 1948.

(4) § Taluk office normal is 3·04", and Rainfall is 2·30".

(5) $ Average of six years data for Tirurkuppam, and seven years data for Pilicode is given as normal.

Weather Review for July 1949.

The monsoon was fairly strong from 1—7—1949 to 9—7—1949 resulting in widespread and localised heavy rains in Malabar and the South Konkan. It became feeble on 10—7—1949; but the very next day, it regained activity due to the unsettled conditions in the Bay. Its subsequent vigour was due to two causes, namely (i) the crossing of a low pressure wave over the Orissa Coast and (ii) the formation of a trough of low pressure over the Central Arabian Sea. The vigour was maintained upto 17—7—1949 and then it again became feeble on account of the shifting of the seasonal trough towards North, away from the normal position. A week later the monsoon again became active owing to the shifting of the seasonal trough closer to the normal position. Thereafter the activity of the monsoon was maintained right upto the end of the month, the reason being the continued unsetttled conditions in the Bay.

As per the rainfall forecast for the months of August and September, issued by the Meteorological Office, Poona, there is a four to one chance that the total rainfall in these two months will be slightly above normal in the Peninsula.

The note-worthy falls in the month are given hereunder :—

Date	Place	Rain fall in inches.	Remarks.
13—7—1949	Mangalore	3·2	Only falls above
14—7—1949	Mangalore	3·3	3·0 inches are given
15—7—1949	Alleppey	5·9	in this table
,,	Palghat	4·2	
,,	Calicut	3·8	
,,	Cochin	3·7	
16—7—1948	Calicut	9·9	
,,	Kakinada	4·1	
17—7—1949	Mangalore	3·3	
21—7—1949	Arogyavaram.	3·3	
,,	Bangalore	4·1	
23—7—1949	Cuddalore	4·0	
26—7—1949	Mangalore	4·4	
28—7—1949	Minicoy	4·0	
30—7—1949	Mangalore	5·4	

M. B. V. N. & C. B. M.

Departmental Notifications

GAZETTED SERVICE—POSTING AND TRANSFERS.

Name of officers	From	To
Sri C. M. John,	On leave,	Oilseeds Specialist and Vice-Principal, Agri. Coll., Coimbatore.
,, Narayanan Nair, P.	D. A. O., Ooty,	Special, D. A. O., Coimbatore under the Govt. Agri., Chemist.
,, Raman Rao, V.	D. A. O., Saidapet,	D. A. O., Anantapur.
,, Suryanarayana, V.	On leave,	D. A. O., Ootacamund.
,, Sivaswami, E. G.,	D. A. O., Under Training,	D. A. O., Saidapet.

SUB-ORDINATE SERVICE.

Appointments—Posting and Transfers.

Sri M. Giri Raj, an Overseas Scholar is appointed as Technical Assistant in connection with the enforcement work of the Fruit Products order.

The following appointments of soil Conservation assistants have been sanctioned for one year for the scheme of Contour Bunding and Contour Trenching in the Ceded districts

Sri Antony Reddy, Y., A. D., Mr. Abdul Kareem Sahib, A. D., Siruguppa; Sri Jagannatha Rao, P., Assistant in Millets, Koilpatti; Sri Kondayya, B., Assistant in Chemistry, Coimbatore; Sri Muhammad Abdul Basheer Sahib, A. D., Koilkuntla; Sri Prahlada Rao, A. D., Penukonda, Sri Narasimha Reddy, A. D., Kalahasti; Sri Narayanaswami, V., A. D., Hindupur; Narasimha Reddy, R., A. D., Proddattur; Sri Radhakrishnamurthi, K., Assistant in Millets, Coimbatore; Raghunada Reddy, D., A. D., Krishnagiri; Sri Rangamannar, D., F. M., Siruguppa; Ramalinga Reddy, K., A. D., Tirupathur; Sri Suryanarayanamurthi, H. A. D., Madkasira; Sri Satyanarayana Raju, Assistant in Chemistry, Coimbatore; Sri Satyanarayana Rao, K., Assistant in Chemistry, Coimbatore.

The following B. Sc. (Ag.) graduates are appointed as Upper sub-ordinates and posted for training in Entomology and Mycology at Coimbatore:—

Bharathan, P. — Mathurai; Gnanavaram, I. — Mathurai, Jayaraja, R. — Tanjore; Perumal, K. — Tirunelveli; Pinagapanui, N. — Chingleput; Selvarangaraju, G. — Coimbatore.

On the completion of their Diploma Course in Horticulture at Madras the following subordinates are appointed to posts noted against each.

Name of officers	To
Adivi Reddy, A.	Nursery Assistant, F. R. S., Kodur.
Bakthavathsalu, C. M.	Fruit Assistant, Banana Scheme, Aduthurai.
Dasaratharamiya, V.	Fruit Assistant, Kodur.
Kothandaraman, E.	A. D., Vegetable Government House Farm, Madras.

Name of Officers	To
Kuppuswami, B. S.	Fruit Assistant, Kallar and Burliar Gardens.
Krishnamurthi, P. A.	Fruit Assistant, Fruit Farm, Tindivanam.
Muddanna Shetty, H	Horticultural Assistant, Coimbatore.
Narasimham, B.	Horticultural Assistant, Agricultural College, Bapatla.
Narasimhamurthi, D.	Fruit Assistant, S R S, Anakapalle.
Prabhakara Reddy, G	Fruit Assistant, Fruit Farm, Siruguppa
Padmanabha Raju, B.	Special A D, Crop Cutting Experiments, Kakinada.
Ramalingam, V.	A D., Attur.
Ramachandran, T K.	Fruit Inspector, Kodur
Raman, K. R	F M, L R. S., Hosur Cattle Farm.
Sankarasubramaniam, T K.	Special A. D., Tobacco Scheme
Subramaniam, J.	Fruit Assistant, Kodur.
Sampath, V.	Fruit Assistant, Fruit Farm, Tirurkuppam.
Tejappa Shetty, K.	Fruit Assistant, Waynad Colonization Scheme.
Venkataraman, T M	Fruit Assistant, F. R S., Coonoor

The following Upper subordinates have been selected to undergo the diploma course in Horticulture at Madras for a period of one year from 14th August 1949

Names	
Azimuddin, A.	A D, Hosur
Bettai Gowder R	Assistant incharge Kallar and Burliar Gardens, Mettupalayam
Krishnan, L.	Agricultural Instructor, Agricultural Training Orthanad.
Madhava Rao, V. N.	Horticultural Assistant, Coimbatore
Nanjappa Maniyagar, V.	F. M., L. R. S., Hosur.
Narayanamurthi, R.	A D, Elluru.
Padmanabhan Nambiar, K.	Fruit Assistant, Agricultural Farm, Waynad
Ramasomayajulu, M V	F. M, A. R. S., Samalkotta.
Ramanathan, R.	A D., Vegetable Scheme, Madras.
Shanmugam, T. S.	A. D, Elayirampannai.
Sambasiva Rao, I. K.	Fruit Assistant, Coonoor.
Samuel Sundara Raj, J.	Nursery Assistant, A R. S, Kodur.
Subba Rao, K.	F. M., A. R. S., Siruguppa.
Sambamurthi, K	Assistant in Fruit, Sugarcane Research, Station, Anakapalle
Venkata Raja Rao, N.	Marketing Assistant, Kakinada
Venkatachalam, C.	A. D., Crop Cutting Experiments, Kakinada

Private Candidates.

Balu, V.	Madras.
Krishnaswami, A. R.	Madras.
Ramakrishnan, V.	Villuppuram.

The following have been selected to undergo the certificate course in Horticulture for one year from 14th August 1949.

George, P Fieldman Government Seed Depot, Madras.
Murthi, P. D. Fieldman Government Seed Depot, Madras.
Palanikumaraswami, P. Fieldman, A. D., Office, Tirupattur.
Panichlaiah, P. Fieldman Kovur.
Palatla Venkateswara Rao. Kotha Agraharam (Private candidate—Stipendiary)
Subba Reddi K. Fieldman. A. D, Office Kurnool.
Venkatanarayana, P. Fieldman, A. D, Office, Dharmapuri
Vaidianathan, L. R. Fieldman, A. D., Office, Lalgudi.

The following B.Sc (Ag) graduates are appointed as upper subordinates and are posted to the vacancies shown against each.

Names	To
Balasundaram I	A. D. Palladam.
Chockalingam, M.	Assistant in Cehmistry, Coimbatore.
Chennabasavaiah, H. S. M.	F M Sugarcane Liaison Farm, Hospet.
Chandrasekharan, S.	A. D. Ponneri.
George, P. F.	Assistant in Chemistry, Coimbatore.
Karuppannan, G.	Assistant in Chemistry, Coimbatore.
Koamojee, B.	A. A. Proddatur.
Nalla Gounder, S. V	A. D. Krishnagiri
Panduranggan, S. V.	F. M. Central Farm, Coimbatore.
Philip, P. K.	Journal Asst. in Malayalam, Madras.
Rajagopalan, D. S.	Cotton Assistant, Tinnies Scheme, Coimbatore
Rajagopalan, G.	Asst. in Entomology, Singampatti Tinnevelli.
Ramakrishnan, S. R.	Asst in Millets, Coimbatore.
Raghuveera Raghavalu, G.	A. D. Podili.
Rangaswami Reddiar, S.	A. D. Hosur.
Rama Rao, K.	Assistant in Chemistry, Coimbatore.
Sethumadhavan, R.	Plant Protection Asst. (Mycology) Trichy.
Sadasiva Shetty, Y.	Assisatnt in Cotton, Coimbatore.
Subbaiah, V.	Assistant In Mycology, Coimbatore.
Sankaranarayanan, R.	Assistant in Millets, Koilpatti.
Subramaniam, S	Assistant in Chemistry, Coimbatore.
Sudhakara Rao, K.	A D. Siruguppa.
Venkateswaran, A. N.	Assistant in Oilseeds, Pilicode.
Varadarajan, E. N.	A. D. Tirupattur.
Veerarayan Raja Kottakal Palace	F.M.A R.S. Nileswar.
Venkataraman. N.	Assistant in Millets, Coimbatore.
Vittal Thirukandeswaram, T. M.	A. D, Chidambaram.
Vaidyanathan, R.	Assistant in Botany, Coimbatore.
Venkateswara Rao, M.	A. D. Eluru.
Viswanathamurthi, K.	F.M-A.R.S. Siruguppa.
Vedanatham, C.	Chillies Asst. A.R.S. Guntur.
Vijayan, P. K.	Asst. Entomology, Orange Borer Scheme, Waynad.

Names	From	To
Sri Ananta Rao, K.	Asst. in Millets Coimbatore,	A. D. Nugur.
,, Appa Rao, K.	A. D. Nugur,	Asst. in Paddy A. R. S. Marutueru.
, Appalanarasimham, J.	Asst. in Chemistry, Coimbatore.	A. D. Perumbonda.
,, Alagiriswami, M.	A. D. Kauru,	Special A. D Maruteru.
,, Bala Bala Raju, G. J.	F M.A R.S Palur,	Special A. D. Kumbakonam.
,, Baskara Rao, M.V.	Asst. in Chillies. A.R.S. Lam	A. D. Chintalapaudi
,, Chintamanai, P. Y.	A. D. Chintalapudi,	A.D. Crop cutting Expert, Kakinada.
,, Duraiswami, K. N.	A. D. Attur,	A. D. Palur.
,, Kanakaprasada Rao, K.	F. M. Cotton Section, Coimbatore.	F.M.A R.S Samalkota.
,, Krishnaswami Iyengar,	A. A. D. Vegetables,	A.A D Tiruvellore.
,, Krishnamurthi, C	A. D Tiruvellore,	A. D. Vegetables, Madras.
,, Kuppuswami, K. P.	F. M. Sims Park, Coonoor,	A. D. Palladam.
,, Krishnamurthi, R.	A D. Ponneri.	A. D. For Sweet Potato, Ponneri.
,, Krishnamurthi, B.	Asst. in Entomology Singampatti,	A. D. Madakasira
,, Lingaiah, M. K.	F. M. Botanic Gardens, Ootacamund,	F. M, Sims Park
,, Muthuswami, P.N.	A D Tirumangalam,	A. D. Mathurai
,, Maqbaloor Rahiman Sahib	on leave	A. D. Kurnool.
,, Manickaraj Samuel,	A. D. Sugarcane Development Work, Vellore.	A D Trichengode.
,, Maduram, G. H.	on leave	Asst in Botany, Coimbatore
,, Muthuswami, S.	Fruit Asst. Banana Scheme Aduthurai,	Fruit Asst. Fruit Farm, Auduthurai
,, Murugesan, G.	A. D. Cotton Scheme, Palladam,	Teaching Asst. in Agrl. Coimbatore.
,, Menon, K. R.	A. D. Srivilliputhur	Fruit Asst. Wynad Colonization Scheme.
,, Mahimai Dass, V.	A. D. Kollegal	A. D. Hosur.
,, Narasimha Ayyar, B S.	on leave	A. D. Tenkasi
,, Nageswara Rao, M.	A. D. Virdachalam.	A. D. Markapur
,, Naidu, S. V.	on leave	F.M.A.R.S. Siruguppa.
,, Papa Rao, P	on leave	A.D. Nugur.
,, Pinto, B. M.	on leave	F.M. Botanic Gardens, Ooty.
,, Ratnakar Batkal,	A. D. Coondapur	F.M.L.R.S. Hosur.
,, Rama Rao, B. K.	A. D. Karkal	A D. Kollegal.
. Rama Doss, A.	A D., Kumbakonam,	P. A., to D. A O., Tanjore
,, Ramakoteswara Rao, G.	Asst. in Oilseeds, Pilicode,	A. D, Koilkuntala.
,, Ramachandra Rao, T.	Asst. in Botany, Coimbatore,	A. D., Hindupur.
,, Srinivasan, T.	Agricultural Instructor Gandhi Basic Training School, Coimbatore,	Agricultural Instructure Agricultural Training School, Orthanad.

Names	From	To
Sri Sivaramakrishnaya, Y.	A. D., Salur,	A. D., Bimilipatam.
,, Srinivasagopala, D.	P. P. A., (Mycology) Tiruchirapalli,	P. P. A., (Entomology) Tanjore.
,, Srinivasan, S. R.	A. D., Tiruchengode,	A. D., Sugarcane Development Work, Vellore.
,, Sivasubramaniam, T.	A. D., Chidambaram,	A. D., Tindivanam.
,, Srinivasa Rao, K.	Asst. in Mycology, Coimbatore,	Cotton Asst. Hagari.
,, Srinivasalu, K.	A. D., Cotton Scheme, Palladam,	A. D., Kalahasti.
,, Subbaiah Pillai,	A. D., Mathurai,	A. D., Thirumangalam.
,, Subba Raja Sastri,	A. D., Ramachandrapuram,	A. D., Razole.
,, Seshagiri Rao,	Asst. in Fruits, F. R. S., Kodur,	Marketing Asst., Kakinada.
,, Venkata Rao, A.	,,	A. D., Sulurpet.
,, Venkaiah, N.	A. D., Razole,	A. D., Ramachandrapuram.
,, Vasudeva Rao, S.	A. D., Vellore,	A. D., Salur.
,, Vaidyanathan, R.	A. D., Tenkasi,	A. D., Karur.
,, Vaidyanathan, R.	Asst. in Botany, Coimbatore,	F. M., A. R. S., Palur.

Agricultural College and Research Institute, Coimbatore.

LIST OF ADDITIONS TO LIBRARY FOR JULY 1949 (Books Only Listed)

1.	BISWAS (H):	German primer for Science Students	1948
2.	BLACK (J. D.): and	KIEFFER (M. E.): Future food and Agricultural Policy Edn. I	1948
3.	CLARK (G. R.):	Study of the soil in the field. Edn 3.	1941
4.	COMSTOCK (J. H.):	Introduction to Entomology 9th revised Edn.	1948
5.	GHOSE (B. C.):	Study of the Indian money market	1943
6.	GNADINGER (C. B.):	Pyrethrum flowers Edn 2. 1945	1945
7.	GOHAR (N):	Mycoses and practical Mycology	1948
8.	GRAVES (H. B.):	Mineral key	1947
9.	JATHAR (G. B.) and	BERI (S. G.): Indian economics Vol. 2. Edn. 8	1947
10.	MASEFIELD (G. B.):	Handbook of tropical agriculture	1949
11.	SOVANI (N. V):	International position of India's raw materials	1948
12.	WEBBER (H. J.): and	BATCHELOR (L. D.): Citrus Industry V. I. History, Botany and breeding.	1948
13.	U. S. D. A.	Year book 1943 to 47 (single Issue): Science in Farming	1947
14.	U. S. D. A.	Year book 1948. Grass	1948

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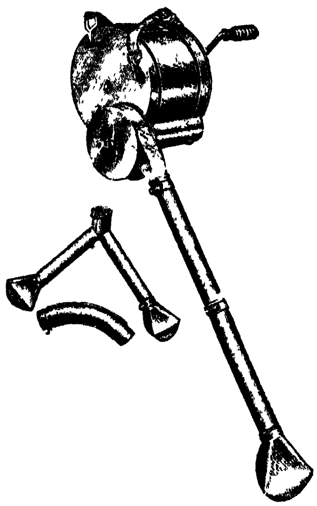

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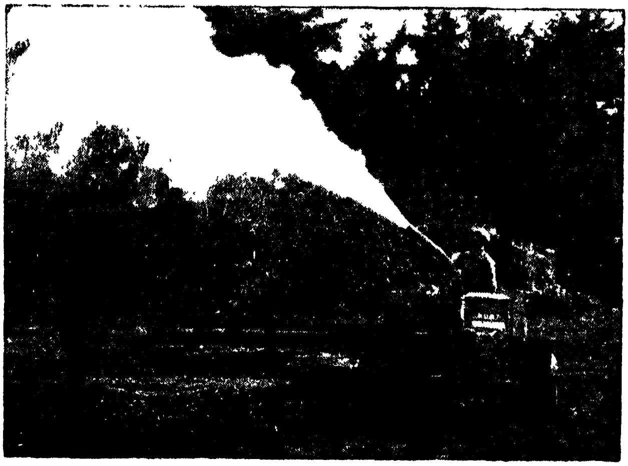

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325	11	more *and*	more *or*
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327	4 and 41	Prodatur	Proddatur
329	5		•
327	12	*round* bud	*sound* bud
327	27	Four *and* weedings	Four weedings
327	35	Bezawada	Bezwada
327	37	*Irrigation*	Irrigations
328	10	*out crop*	*crop out*
329	34	*the* plank	*a* plank
330	8	5 %	50 %
331	6	The *side*	The *sides*
331	6	*17* candies	*70* candies
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